THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER AND ELECTRO-PLATERS REVIEW
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SOME OF THE USES OF ELECTRO-COPPERING.

COMPARATIVE METHODS OF COPPER COATING STEEL CYLINDERS.

BY ELECTRON.

In these days of superlative engineering, giant undertakings and "hustle," the necessity of smooth working systems goes without saying. Every link in the chain, every rivet in the structure, must be as good as the best. Wear and tear is minimized, corrosion and decay prevented, as far as human foresight can attain. For these reasons engineers—and hydraulic and dock engineers especially—are specifying copper coated rams and copper lined cylinders in the machinery actuating gates, sluices and so forth, not only where the water is known to be corrosive, as the Clyde, but generally where sea and river water is used.

Under ordinary circumstances rust and corrosion overtake the cast-iron working parts of hydraulic machinery. A rusty ram gets into a nasty habit of jibbing at a critical moment, or at best its progress is a series of jerks most offensive to an engineer's eye, and most disastrous to the leathers. All these drawbacks are prevented by the copper coating.

COATING BY ELECTRICITY.

Rams are coated electrolytically. The casting, it may be 14 or 15 ins. in diameter and a couple of tons in weight, is turned ¼ in. less in diameter than the finished size, when the coating is required ⅛ in. thick. It is left with a rough cut down the whole of its length with the exception of two or three inches at each end, where the tool is allowed to undercut as shown in Fig. 1.

This form secures a watertight deposit by locking the ends. Formerly it was the custom to deposit the coating with its ends filling a slow radius, or in the case of round-nosed rams, following the curve of the nose. This, however, invited trouble. The continual wear, and the persistence of the pressure water resulted in its creeping beneath and raising the copper in a blister; the next stroke of the ram tore and pushed it into a wrinkled scab.

From the lathe the ram goes to the drilling machine, where holes are drilled and tapped for a trunnion end to be bolted on. The shank supplies the means of carrying the other end. After a thorough scouring with sand and water, and a dip into a hot solution of soda to remove the last traces of grease, the ram is immersed in a cyaniding solution, in which it slowly revolves for 24 hours. Here it takes a very thin coating of copper preparatory to the serious business of depositing the covering. This is performed in a wooden lead-lined vat, across the bottom of which stout lead-covered batteries are laid to carry the bearings on which the ram revolves. Two substantial copper anodes, cast in the shape of a right-angled triangle, lie on the bottom of the vat, along its length, and between them the ram is nested. The trunnion end, of brass to take in the current, carries a stout spindle of lignum vitae which is forced into it, and attached to this is a metal fork, of a non-corrosive mixture, engaging with a stud in a revolving arm, belt driven from below ground shafting.

A copper sulphate solution is then run into the tank, and the current switched on. The positive current flows through lead conductors to the anodes, while the negative current is taken by flexible copper brushes working directly on the ram. After running free for an hour or two to allow the coating to "take," the burnishers are applied. These are small slabs of agate, fitted in lignum vitae legs, tongs-like, clipping the ram on both sides, and made to exert quite a considerable pressure by means of a spring and wedge arrangement. The whole is carried on a cast-iron frame which travels up and down the length of the

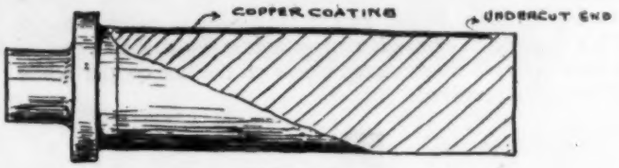


FIG. 1. COPPER-COATED RAM.

tank, automatically reversing at each end, and occupying half an hour in the passage. Burnishing produces a smooth, hard copper of uniform density, rendering an otherwise crystalline metal tough and malleable. Tensile tests show from 15 to 16 tons per sq. in., with an elongation of 35 to 40 per cent. in six inches. Burnishing is, in effect, cold forging. After running continuously, it must be an uninterrupted run for fear of laminations, for a week or ten days, the coating will be about 3/16 in. thick, bright and smooth as polished gold. All that now remains is to run off the sulphate solution, remove the ram to a lathe, and turn and file it to the required diameter. Absolute accuracy is assured by the use of a ring gauge which is slipped on before the ram takes the centers; and in a lesser degree by the use of a circumferential tape.

COATING BY DRAWING.

Until the disposition of copper was brought to its present state of perfection, it was the custom to coat rams and rollers by drawing seamless, or in some instances a brazed copper tube on to them. In other words, the ram was placed inside the tube, and the two drawn through a steel die which crushed the copper tightly on to the ram. But there were serious objections to this method. The coatings nearly always worked loose, because the copper and the cast iron made no intimate, permanent connection,

as happens in the case of electro-deposition. And it was obviously impossible to treat rams of 5 tons or over as is done today. The exigencies of modern business require coated rams for presses for lead piping, cotton baling, sugar refining, lifts, and coated rollers for textile machinery, calico printing, paper making, etc., etc.

To successfully copper-line hydraulic cylinders requires special experience and appliances, and I do not think there are two firms in this country who could handle cylinders of, say, 18 ins. internal diameter by 15 ft. long. At the Leeds Copper Works, however, such work is constantly dealt with; indeed, there is no practical limit to the possibilities of the electro-depositing system. Seamless copper cylinders of 3 ft. diameter and upwards are regularly turned out.

The liner for an 18-in. hydraulic cylinder would be about 3/16 in. thick; it must be watertight and expanded tightly and evenly against the cylinder walls. The ends are flanged over to prevent pressure water getting between cylinder and lining.

The manufacture of the copper liner is a very similar process to that of coatng a ram, except that the coating must be removed from the 20-in. mandrel on which it is deposited. To facilitate this the mandrel is carefully blackleaded along its entire length. When the deposition is completed and the coating is of the required thickness at its thinnest place, an important point, as in spite of its deceptive smoothness there is considerable variation circumferentially, the mandrel is run in a lathe between three rollers, which travel along its whole length, until the shell is slightly expanded and will leave the mandrel easily.

The operation of drawing the liner to its necessary thickness commences by "nozzling" one end, *i. e.*, reducing its diameter so that it may readily enter the die. This is done in cone-shaped swaging tools, the upper of which delivers short, sharp blows on the hot copper while it is slowly revolved.

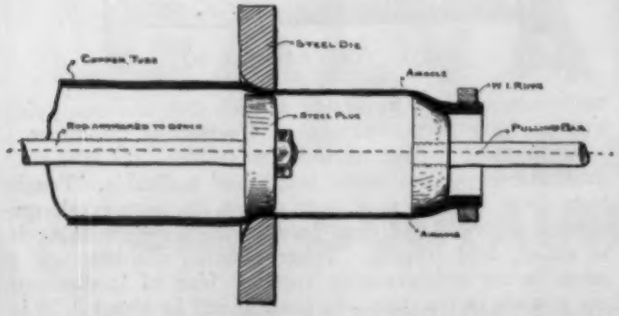


FIG. 2. METHOD OF "PLUG" DRAWING.

Fig. 2 shows the method of drawing, which is termed "plug" drawing, as distinct from "bar" or "mandrel" drawing. An exceedingly heavy and powerful drawbench is employed, fitted with a flat-link chain having rivets 2⅛ in. diameter.

The steel die is backed by a strong frame and the plug is anchored to the end of the bench. Half the difference in the diameters of the plug and the hole in the die is of course the ultimate thickness of the liner. The pulling bar engages with a wagon carrying shaped spiked teeth which grip the flat-link chain, moving at 10 ft. per minute. To prevent the pulling head bursting through the nozzle, a wrought iron ring is slipped over the end. Small holes driven through the copper behind the pulling head, admit air to prevent a vacuum forming and the inevitable collapse of the liner.

When drawn the tube measures about ¼ in. larger in its outside diameter than the bore of the cylinder, and a very little thicker than 3/16 in. To draw it into the cylinder is but a simple matter; this being done, one end—the nozzled end—of the projecting liner is sawn off and about 1½ ins. flanged over.

The final operation, expanding the copper tightly against the cylinder walls, so as to leave the bore exactly to size, is a little anxious. If the casting is unbored, or has been carelessly bored in steps, the passage of the plug may crack it. To ease the work as much as possible and at the same time exert sufficient pressure on the liner, a cast-iron plug is used, some 5 or 6 inches smaller in diameter than the cylinder. Around its circumference, which is grooved to secure it in position, is cast a hard white metal ring. This is turned and polished to the required size, and being a softer and more persuasive expander than steel, minimizes the danger of cracking the cylinder when the plug rides over a small place in the bore. This plug, having been drawn through, the uncut end is sawn off and flanged, and the cylinder is ready for the engineers.

UTILIZATION OF ZINC SCUM.

In the so-called "galvanizing" process of sheet iron and steel (lucus a non lucendo) there goes to waste a great deal of zinc, partly by reason of oxidation of the leted metal through contact with the air, partly by alloying itself with the iron, and partly by mixture with various impurities. As a rule the refuse consists of zinc oxid, zinc chlorid, zinc oxychlorid, minute particles of metallic zinc, ammonium chlorid, and small quantities of foreign substances. There have been proposed and tried, for the purpose of winning the metallic zinc from this scum, various processes; but most of them succeed in extracting only a small portion thereof. In a process described in the "Alldemeine Ingenieur-Zeitung" the greater part of the zinc is recovered in the metallic state, and a small portion as zinc oxyhydrate; ammonia being a third minor product.

One part of the scum can be put in such a form that metallic zinc can be obtained therefrom, without poisonous gases being generated, which would be injurious to the workmen and the neighborhood generally. That part of the scum which is soluble in water yields chlorides for the purpose of forming zinc oxides and ammonia. The waste material is crushed fine while being plentifully supplied with hot water.

The fine product is then boiled until tests show that all the soluble substances have been dissolved. The mixture remains in the receptacles until the insoluble portions have settled; the muddy liquid is pumped off and the sediment dried. About 55 per cent. is insoluble in water; the other 45 per cent. are soluble in water and contain chlorides, which have an acid reaction. The dried solids are then treated in a reduction furnace, where they yield metallic zinc without giving off noxious gases. From 50 to 65 per cent. of these solids is metallic zinc. The solution is filtered into wooden vats in which they are neutralized by liquid, or still better gaseous ammonia. This takes but little time, but requires careful watching, as excess of ammonia would cause loss of zinc by re-solution of the zinc oxid.

As a resulting product there is a solid substance (hydrated zinc oxid) and an ammoniacal solution. The ammoniacal solution is passed through a filter press, which retains all the hydrated oxid. The oxide is pressed into cakes and dried; the solution is evaporated to crystallize out the ammonium chloride.

THE ART OF DESIGNING.*

The Decoration of Form as Applied to Metal Design.

By A. F. Saunders.

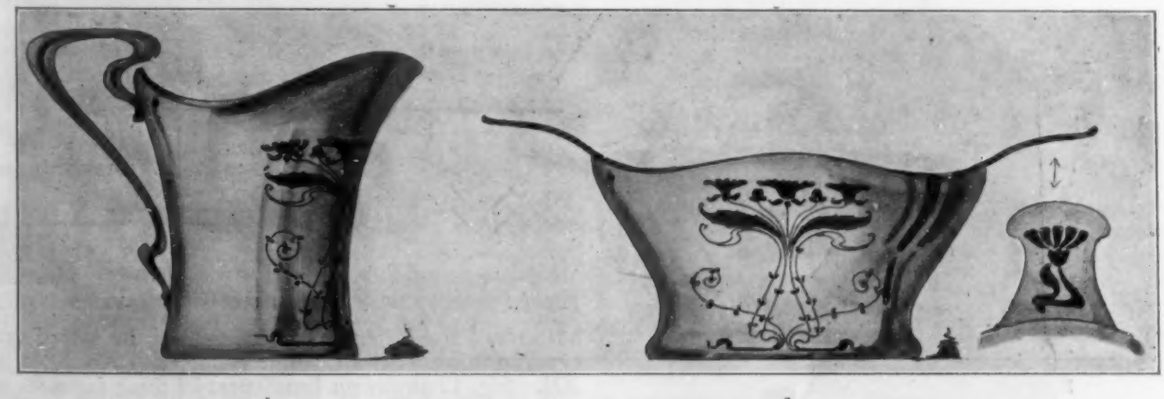
In beginning this, the second, article on suggestions in design for the metal worker, I quote the third most important principle: All ornament should be sub-ordinate to the object ornamented, and if kept duly sub-ordinate the object cannot be over-ornamented; also that simplicity in composition is more difficult of attainment than complication.

1. 2. 3.

FIG. 1. NATURALISTIC DECORATION.

Properly understood the conformation and application of ornament should be in complete harmony with the form or structure which it adorns, should be in complete subordination and should never conceal its purpose of adding interest and beauty to the object; also it should be influenced by the material of which it is made.

In the decoration of an object it is essential that the designer thoroughly understands that all parts are not equally important; he must know where to emphasize and where to conceal. Naturally parts most prominent should receive first attention. This does not mean that such parts must be covered with ornament, but that they require



1. 2.

FIG. 2. CONVENTIONAL DECORATION.

As I am writing for the benefit of the metal craftsman I shall endeavor to confine myself to those principles and suggestions best suited for his work. He must have a certain amount of knowledge and appreciation of his material, its possibilities and nature and should use it as a medium of expression; his ornament should be worked out of the material itself, not added upon it. Admitting that this is a principle that cannot always be lived up to under modern methods, however it is for the craftsman to help cultivate interest and true appreciation in real art workmanship. To accomplish this he must aim to follow true principles whenever possible.

first thought or study that the general arrangement be properly proportioned and in harmony with the character of the outline.

Consult illustration (Fig. 1) of vase No. 2 or 3; note the location of its decoration. In this shape the top is most prominent. Its interest diminishes as we go down,

*The first paper was published in July, 1909.

yet the base requires ornament enough to suggest proper balance and support.

Properly speaking design might be divided into two parts—conventional and naturalistic—the former covering patterns or motifs based on natural forms, yet more or less the fancy or imagination of the designer; while the latter represents purely natural forms as they appear in nature (note decoration on Vases 1-2-3 and Cream and Sugar 1-2). Sometimes it is possible to combine both the natural and conventional with most pleasing results. These are all details that go to make up design, and if once properly understood and applied, combined with good taste and careful study, one can not but help create good design and objects of beauty. Adopt a standard of good workmanship and live up to it. Following I quote three fundamental principles as applied to decoration. My next article will be on the various methods of application.

1. Natural growth should be the law in ornamentation, and branches or scrolls made always to flow in their growing directions.

2. Avoid shams both in construction and ornamentation.

3. Elegance of leading lines is of far more consequence than after adornment; for this reason the scroll form of enrichment has been so universally adopted in all ages because of its beauty as a leading line or stem.

THE DEVELOPMENT OF MELTING FURNACES.

A Description of the Earliest and Latest Types.

By L. J. Krom.

(Continued from September.)

THE PAXSON-SHEELER FURNACE.

For this furnace, which is of the forced draft crucible type, the manufacturers make the following claims as to specifications and performances:

Fuel used, coal and coke, for heat 80 lbs. Time of each heat, 1 to 1½ hours. Heats per day of 10 hours, 6 to 8. The metal is hotter and stronger. Only an inexpensive chimney required to carry away the gases and smoke. Crucibles will run 15 to 25 heats. Blower is of positive pressure or fan type. The time of heat is known as against an unknown quantity in the natural draft type.

Pressure of blast in ounces is 1½ to 6. Blast inlet to each furnace 3 to 6 inches diameter, regulated by a blast gate. The number of fire brick for the lining is 130 and for the base 50. An old 70 crucible with the bottom knocked out is used as a feeder and to deliver hot metal to the crucible in the furnace. The top covers are split or cone shape. The loss by oxidation is: In melting red brass, 1 per cent.; in melting brass turnings, 1½ per cent.; in melting yellow brass, 2 per cent.

OBERMAYER FURNACE.

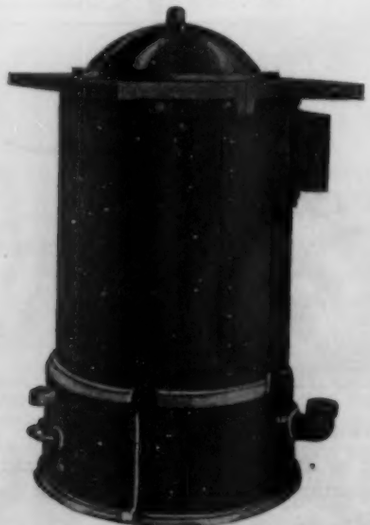


FIG. 11. OBERMAYER BRASS FURNACE.

Fig. 11 shows the form of crucible furnace made by the S. Obermayer Company of Cincinnati, O. These furnaces are run with coal or coke with natural draft. They are made of a standard construction steel shell, circular in shape and are lined up with specially designed fire brick. They are fitted with solid one-piece cast iron dumping grates, and either flat or dome-shaped top covers. Four sizes are made of these furnaces, running from 20 to 32 inches in diameter and of a crucible capacity of from number 10 to 100. The same style of furnace is built by this company, adapted for forced draft, and is so arranged as to be set in

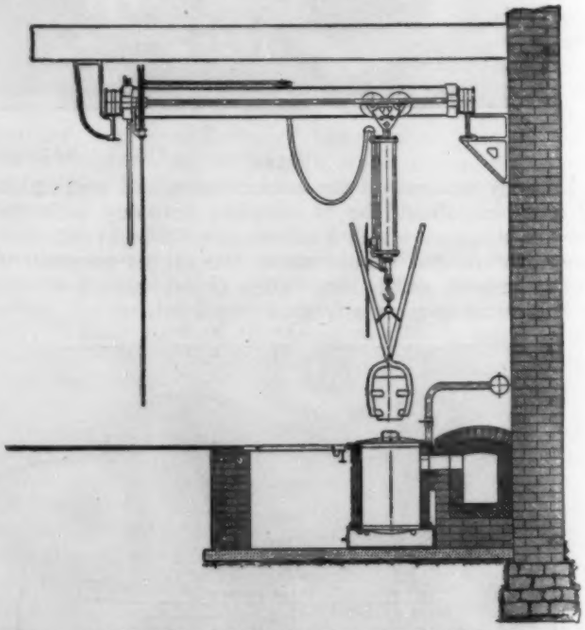


FIG. 12. END VIEW OF BATTERY OF OBERMAYER FURNACES.

batteries. Four sizes are also made of the forced draft type, running from a crucible capacity of No. 10 to No. 300. Fig. 12 shows an installment of these furnaces and the arrangement of the pneumatic crane for taking the crucible from the fire.

STATIONARY CRUCIBLE FURNACES USING OIL OR GAS.

Of the large number of metal melting furnaces in use, the class that more nearly approaches ideal conditions are those that are operated with gas or oil, used under pressure. We have already told of

the superior advantages of using fuel in a concentrated form, as it were, and it is not necessary to repeat it here. The merits of the furnaces we are sure will show for themselves.

DOWN DRAFT MELTING FURNACES.

This style of furnace shown in Fig. 13 is manufactured by the American Gas Furnace Company, 23 John street, New York, with factories at Elizabeth, N. J. The furnace is operated by gas and is intended to be used for silver, copper, brass, nickel, etc., and also for test melts of iron and steel. The burners enter the cylinder tangentially from opposite sides with a downward inclination, and inject the gas flame into the space surrounding the crucible under the required pressure to secure its spiral rotation downward around the crucible.

The crucible is supported by a cylindrical fire brick slightly raised above the level of the furnace base.

FIG. 13. GAS FURNACE.

The crucible support is about three inches less in diameter than the interior of the cylinder, thus leaving a clear passage or slot around its outer edge, through which the exhausted flame passes to the bottom, which connects with the chimney by a draft flue. The hole in the cover provides access to the crucible for feeding the metal and for observing it. While melting, the feed hole is kept closed, and the products of combustion escape by being forced into the draft flue.

Some of the advantages claimed to be secured by this construction are, that the furnace is free from obstruction by overflow and is easily detached for renewal of linings. The fuel is utilized without loss of live heat and the fumes are carried into the chimney with the products of combustion. The furnace is built in a number of sizes as standard from a No. 25 to a No. 100 crucible; sizes above No. 100 crucible have a construction that is modified by inserting additional burners, and the base supporting the cylinder is enclosed with it, by one solid wrought-iron cylinder resting on a cast-iron bed plate.

For venting the products of combustion a chimney is not required. The draft flue may be extended by piping to the outer air, or the flue may be left open where no objectionable fumes are to be taken care of, as in melting clean metals.

Fig. 14 shows an installation by the company for the United States Mint, at Philadelphia, Pa. It is a down draft melter, encased in the manner of coal furnaces formerly used there, and combines efficiency and convenience with a notable absence of radiation. The heat is confined to the heating space surrounding the crucible, beneath the split covers which enclose it at the top and are readily moved apart or closed by means of a lever. The crucible rests upon parallel slabs which raise it about two inches from the furnace bottom, and leave a space between them which forms a channel under the center section of the crucible. This channel communicates with the transverse flue, located above the covers, where the escaping heat is utilized for heating ladles, stirring rods and covers. Provision is made at the bottom to catch any metal that might flow down from a broken or leaky crucible. This particular furnace was built for a No. 70 crucible, but any size can be made; of course, a furnace

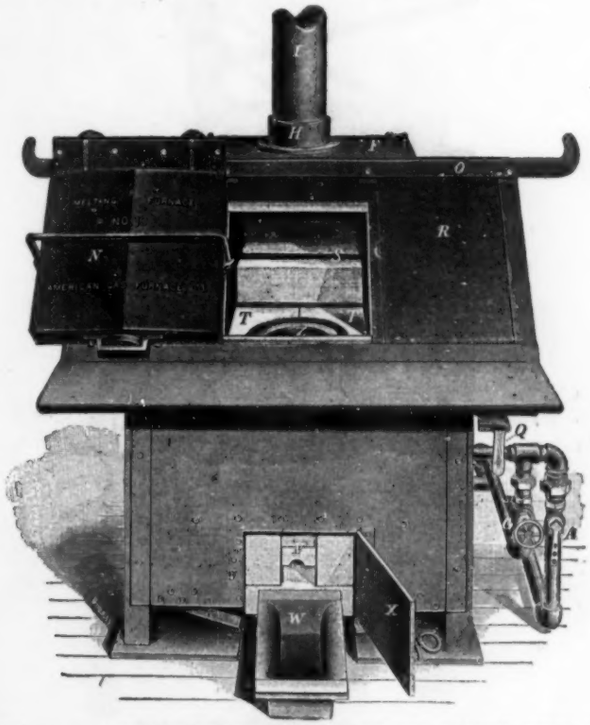


FIG. 14. DOWN-DRAFT MELTER IN UNITED STATES MINT IN PHILADELPHIA, PA.

can only be used with the particular size crucible for which it is built.

THE LITTLE DEVIL FURNACE.

The furnace shown in Fig. 15 is made by the Westmacott Gas Furnace Co., Providence, R. I., and represents their well-known type of Little Devil melting furnace.

This furnace is designed primarily for the smelting down of sweepings, filings, etc., and for refining. It can also be used equally as well for melting brass or copper and, in fact, for any purpose where a large crucible is needed. The furnace is constructed to take a No. 14 black lead pot. It will melt in a satisfactory manner brass, copper, gold, silver, etc. When it is to be used for melting either brass or silver the furnace is used as shown in the cut with four burners, but where gold or copper are to be melted, eight are necessary to produce the much greater heat required in reducing these metals. It is also used for smelting down sweepings, filings, etc. and can also be used to good advantage for refining. The cover, by a simple mechanical arrangement, "lifts" about a half inch when the lever is pressed downward. While in this position it can be swung out of the way on either side with little or no exertion. The construction of the entire furnace, excepting, of course, the pipe, is cast iron and a

special quality fire brick which is especially made and which resists high temperatures more effectually than any other brick. With four burners this furnace will melt down 50 lbs. of brass in about twenty-five minutes with a consumption of about 7 cu. ft. of gas. With gas at $1.00 per thousand cu. ft. the cost per pound of metal reduced is approximately .014 cents per pound.

Of course, in connection with the furnace, a positive air blast of at least one pound must be supplied to secure

FIG. 15. LITTLE DEVIL FURNACE.

proper results. A fan blower will not give sufficient blast under any conditions and either a positive pressure blower, which will deliver the air at a pressure of one pound to the sq. in., or a compressed air system is required.

SPECIFICATIONS.

Capacity	50 lbs.
Gas consumed per hour, 4 burners, about	150 cubic feet
Gas consumed per hour, 8 burners, about	160 cubic feet
Floor space	16 ins. x 16 ins.
Weight, ready for shipment	450 lbs.
Price, 4 burners	$90
Price, 8 burners	$100

THE STEWART.

The furnace shown in Fig. 16 is known as The Stewart and is manufactured by the Chicago Flexible Shaft Company, Chicago, Ill. The method of operating this furnace is by the use of either gas or crude oil as fuel, combined with air under pressure. Approximately six to eight times the volume of air is used to the volume of gas or oil, which makes possible the obtaining of practically any degree of heat at a low cost of fuel consumption, the heat being under absolute control of the operator; and heats can be obtained in one-half the time formerly required in the old-style furnaces. The crucible rests upon a support, thereby elevating it from the bottom of the fire-clay lining in the furnace. The burners are properly placed, so that the heat will be evenly distributed over the entire crucible, and placing the burners close to the bottom of the furnace makes it possible to utilize all the live heat, which has a natural tendency to rise. The direct flame from the burners rotates around the crucible, adding greatly to its life and preventing the objectionable scalping of crucibles which is the case when a certain portion is exposed to the intense heat while the balance is practically cold.

A heat of approximately 100 lbs. of yellow brass

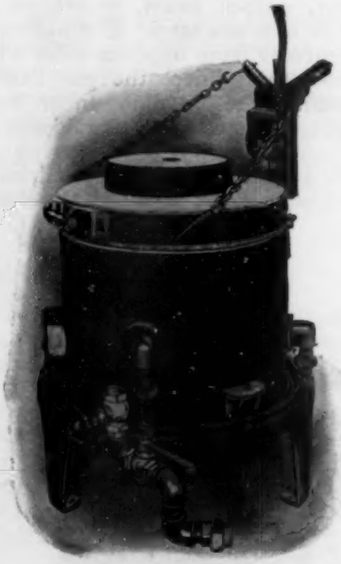


FIG. 16. THE STEWART.

turnings can be taken off in this furnace one hour after being placed therein for melting. When the furnace is started cold, a heat can be accomplished in one hour and a half. When making light, ornamental, yellow brass castings or medium, plain castings from turnings melted in the furnace, there will be practically no rough or porous castings; due to the uniform method of melting.

FISHER CRUCIBLE FUEL OIL FURNACE.

The Fisher Furnace, which is the invention of Alfred Fisher, of Chicago, Ill., is claimed to be the most successful of the melting furnaces using oil for fuel. As will be seen by referring to Fig. 17, the flame is introduced at a tangent, and is, therefore, directed around the crucible. The round form of the firepot causes the flame to take a circling movement, so that the heat envelopes every part of the crucible. The furnace has two covers, the inner one being designed to make a saving in time and fuel and to bring the metal to the pouring temperature quickly, the outer cover serves to protect the workman from the heat and also acts as a feeder for the crucible. A drop bottom is supplied to the furnace to allow for cleaning out any slag that may accumulate.

The manufacturer claims for this furnace, that it is ready for another charge in two minutes from the time it is poured, thus averaging the required temperature nine hours out of every ten, while the coal furnace will not average over six or seven hours.

Also an operating cost of 6½ cents per 100 lbs. of metal melted, figuring crude oil at 4 cents per gal., melting any kind of metal from copper to scrap sheet zinc. The loss in melting yellow brass is figured at 1¼ per cent. The furnace is regulated by its valves

to melt any metal whatever. In Fig. 18 we show a battery of these furnaces which have replaced thirteen coal-fired furnaces at the plant of the Federal Company, Chicago, Ill.

THE WOODISON OIL FURNACE.

A furnace built on simple, economical lines calcu-

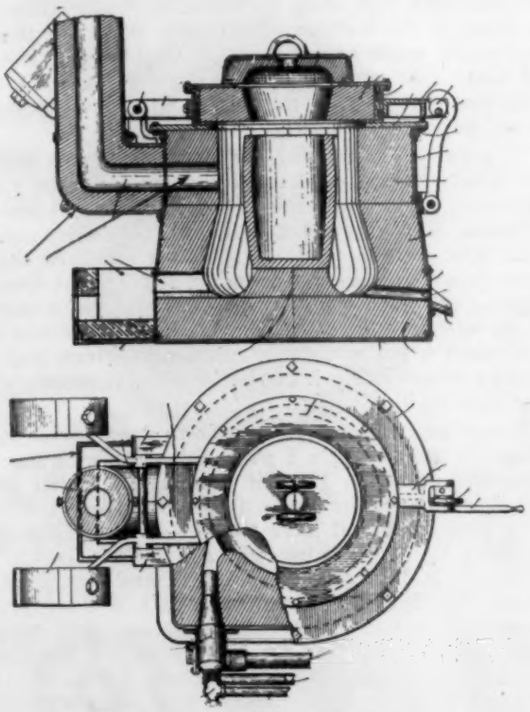


FIG. 17. FISHER FURNACE.

lated to be run with oil and yet give the most efficient results obtainable is shown in Fig. 19. This furnace is manufactured by the Detroit Laundry Supply Company, Detroit, Mich.

FIG. 18. BATTERY OF FISHER FURNACES.

Of course all of the advantages accruing to furnaces run without solid fuel are claimed for this one by the makers. They say, "No coke to handle; no kindling wood; no fires to build; no ashes to get rid of; more heats per furnace. The saving of all metal which, in a coke or coal furnace, will slop over in the ashes."

By actual test these furnaces have been run at a cost of 7½ cents per cwt. of brass and bronze melted, figuring oil at a cost of 4 cents per gal. It is possible to get out a heat in 55 min. using a No. 70 crucible.

(To be Continued.)

FIG. 19. THE WOODISON OIL FURNACE.

SIXTH CONGRESS OF THE INTERNATIONAL ASSOCIATION FOR TESTING MATERIALS.

Secretary Marburg of the American Society for Testing Materials, says in a circular just issued, relating to the recent election at the Copenhagen meeting, of Dr. Charles B. Dudley, of Altoona, Pa., as president of the International Association:

"It will be remembered that at the last annual meeting of the society resolutions were adopted conveying to the International Association, through President Dudley, a cordial invitation to hold the next congress in this country. The news of the acceptance of this invitation, with the added compliment to our worthy president, will doubtless be received with keen gratification by every member of the society. The immediate effect should be a marked stimulation of the American membership of the association."

He also announces that the Executive Committee of the American Society for Testing Materials has authorized the creation of the following new technical committees which are now in course of organization: On Standard Tests of Insulating Materials, on Alloy Steel, on Non-ferrous Metals and Alloys, on Explosives, on Standard Samples, on Standard Specifications for Wrought Iron. The sixth congress will be held in America in 1912.

SOME PRACTICAL SUGGESTIONS REGARDING LACQUERING.

Lacquering Wet Work.

By W. A. Jones.*

For many years some lines of metal goods have been lacquered without drying. This has applied mostly to trunk hardware and to small work and cheaper lines. The so-called sling lacquers have been used for this purpose. Some very good work is done this way but the finish is not equal by any means to that obtained by a good celluloid lacquer. The old fashioned sling lacquer remains rather soft, showing white or "chalky" when scratched.

On some lines it is almost out of the question to dry the work with sawdust, partly on account of cost and more particularly because little pieces of sawdust remain in the crevices. When such work is dip lacquered the sawdust floats on the surface of the lacquer and spoils the finish on much of the work by leaving it dusty. Also with some work that is colored on the wheel it is difficult to hold the lustre and color if it is dried with heat after being cleaned. Some have tried drying by washing in benzine, but this leaves a greasy surface that is apt to cause peeling of the lacquer.

The above conditions the plater and lacquerer have had to meet. The usual gum lacquer cannot be used on buckles, picture frames, buttons, etc., and still have a satisfactory finish. The manufacturers of soluble cotton lacquers have all specified that the work must not only be free from water, but even from traces of moisture. They had good chemical reasons and I have felt the same way. The finisher was not worrying about chemical reasons; he had work to finish and no matter what the chemists said about peeling and water making the lacquer acid he tried his wet work in his usual cotton lacquer. He got results and here and there different finishers tried it and it worked. Of course judgment had to be used. The use of soluble cotton lacquer in this way has been going on for three or four years. Its use is increasing all the time and now is becoming very general and it is sure to come into more general use.

The manufacturers advised against the method, and indeed said it was impossible, and for good theoretical reasons. In the first place water is exceedingly antagonistic to soluble cotton and it would seem that the work must peel. Further, amyl acetate in the presence of water (even if barely moist) is broken down and gives free acetic acid. This brings visions of green drip and discoloration. There is no doubt at all that this breaking down does occur. I have seen people dipping polished work in soluble cotton lacquer containing so much water in suspension that it look like milk. It almost made me shiver, but when the drip had run off and the work dried coming out in good shape I had to admit that I had been "shown." If the water is drawn from the bottom of the tank every night there is no great tendency for green drip. I have wondered a good deal how it was possible to keep free from acid. Surely the amyl acetate is somewhat decomposed. If you doubt it take an ounce of neutral amyl acetate and an ounce of very slightly alkaline water containing a few drops of litmus. The litmus will be blue. Let stand a few days shaking occasionally and the litmus solution will turn red, showing presence of acid. Unless the water was too alkaline the litmus will turn red over night.

*Chemist Celluloid Zapon Company.

While the water is the cause of the solvent becoming acid, it is almost surely the excess water that removes the acid. Acetic acid is more soluble in water than in lacquer and the little globules of water constantly settling to the bottom of the tank wash out the acid and as the water is drawn off, most of the acid is drawn off also. This would seem to be the explanation. Anyway the method can be and is used, so the explanation is not important.

A great deal of a finisher's trouble comes between the final washing and the lacquering, not only from sawdust, but from a finger mark, a spot of water, a flyspeck, etc. The work looks nice when dry and any little spot previously unseen shows up when the lacquer gets dry. Even the action of the light seems to slightly tarnish a clean surface and also has something to do with cyanide spotting. If the finisher can clean and wash his work, get it chemically clean and then plunge immediately into the lacquer, it certainly is a big help to him.

I may be considered a heretic to even advise such a thing. I am not sure I ever did, even with our own lacquer, and when I see it done I feel rather afraid, but it is being done and will be done more and more. Of course some will have trouble. The lacquer manufacturers have trouble enough as it is. It is hard to keep a lacquer A-1 in quality for clean and dry work. It seems like flying in the face of fate to suggest anything that would add to our troubles. Still progress only comes through lots of hard work and trouble and if I am laying up trouble for others, I am for myself also. The lacquer man wants and needs such a lacquer. If he keeps at it, consistently but not too impulsively, he will get what he wants if it is within the bounds of possibility. If lacquers not made for this work are being used successfully, why cannot lacquers be made to give results on any kind of wet work?

Regarding the best kind of lacquer for wet work, none of us know very much so far. Generally speaking most any good spray lacquer will give results. Naturally the lacquer should not contain wood or grain alcohol as these would be washed out by the water and cause excessive loss of lacquer. The lacquer should contain some good gum and shellac is not advisable as it is a strongly acid gum and also is very sensitive to water, tending to dry down white.

In this case, as in most others, the manufacturer is dependent on the results reported by the practical user. A few laboratory tests are worth nothing. Report the exact nature of your trouble, work with the manufacturer and you will help the manufacturer and enable him to give you what you want. This is true of all lacquers. If you do not show the manufacturer what you want can you rightly expect him to guess it?

There is a different way of handling wet work that is worth mentioning. Clean as usual, dip finally in clean hot water, shake off excess water, shake in thinner, then dip immediately in the lacquer. This can be used on practically any kind of work, even silver plate. The thinner is not lost for what clings to the work is added to the lacquer. It is immaterial whether you pour in thinner with a measure or keep adding a little on the work itself. The water very quickly settles out of the thinner. If it does not then ask your manufacturer for a thinner for this purpose.

A BRASS FOUNDRY IN A STEEL MILL.

INTERESTING DEVELOPMENTS AT THE PLANT OF THE BETHLEHEM STEEL COMPANY.

When one stops to consider the many details connected with the production of steel, it is not surprising to find the entire attention of a steel mill concentrated upon this one metal. There is, however, in every large manufacturing steel mill, a continual demand for the use of copper, brass, bronze, aluminum and other alloys. The general practice has been to purchase outside whatever is required in the non-ferrous metal line. To this rule there is one notable exception. The Bethlehem Steel Company, of South Bethlehem, Pa., about four years ago decided to produce all of its own metal, whether steel or not. To this end a brass foundry was installed, and after considerable experimenting, finally established its present up-to-date foundry system.

CHAS. E. RYBERG.

BURTON T. MOORE.

Fig. 1 shows the interior of the foundry, which is capable of turning out fourteen tons of non-ferrous metal per day of ten hours. There are fourteen pit furnaces, each capable of carrying a No. 400 crucible, and are run with coke for fuel. In addition to this they are installing a five-ton reverberatory furnace. The foundry is equipped with a ten-ton electrically-driven crane which runs the entire length of the shop. There are five ladles of a capacity of from one ton up to five, in fact, the foundry, as will be seen from the picture, is equipped with every known appliance for economical and efficient production.

FIG. 1. SHOWING A BRASS CYLINDER IN PROCESS OF POURING.

In relation to the style of furnace used, the company has given a fair trial to all of the modern portable furnaces both with forced and natural draft and

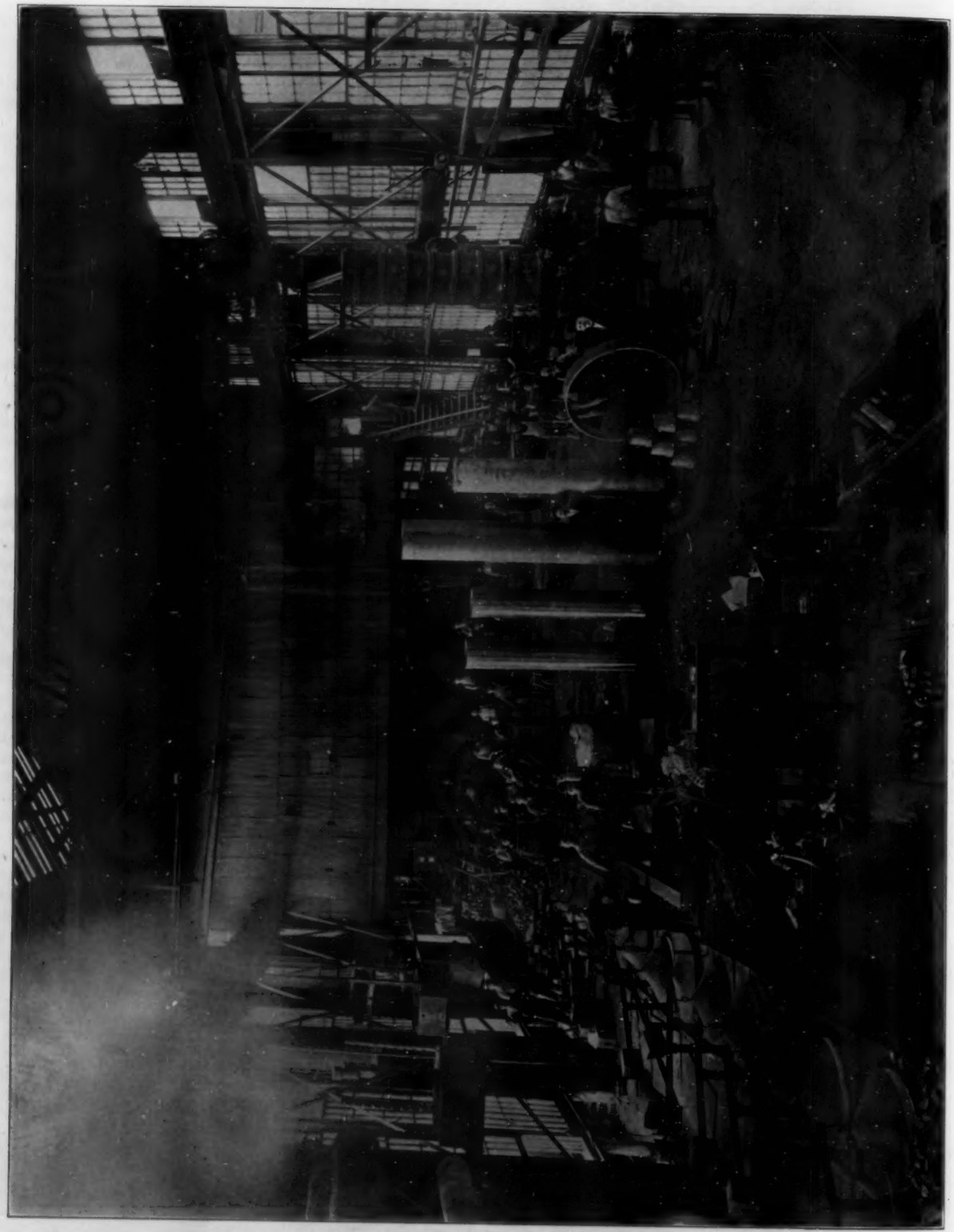


FIG. 2. INTERIOR OF FOUNDRY, SHOWING FINISHED BRASS CYLINDERS AND COPPER TUYERES.

have gone back each time to the pit type. They are convinced that for their particular requirements better results are obtained by their present methods.

OUTPUT OF FOUNDRY.

The class of material turned out by this foundry consists, as will be seen by referring to the picture, Fig. 2, of castings of all kinds and descriptions, they range in size and weight, from a small two-way coupling to brass or bronze cylinders, twenty feet long and weighing 9,000 pounds. One of the important productions is a water-cooled copper blast furnace tuyere which has been found to be far superior to the ordinarily-used steel tuyere. This copper tuyere, a pile of which is shown in the foreground of the picture, Fig. 2, is cast with a hollow wall and holes are left in the large end to allow for the circulation of the cooling water. The composition of this casting is 99 per cent, copper with the balance silicon, tin and phosphorus to give it density. These tuyeres are furnished for the outside trade and already a large business has been built up in them.

Another product, and one entirely foreign to the steel business, is a line of brass cylinders, used in the manufacture of paper.

These cylinders or rolls are upwards of 20 ft. in length and 36 in. in outside diameter, with a wall varying from ½ to 1 in. in thickness and weigh 76,500 lbs. One of these cylinders is shown in the process of casting in the illustration, Fig. 1. The core on which these castings are made consists of a steel pipe, perforated with small holes to allow for the escape of gas, and built up to the required diameter with small hay rope and ground clay.

The mould is made by simply placing one heavy cast-iron circular flask on top of another and ramming up with moulding sand until the needed length of casting is obtained. The cylinders are all cast on end with a circular runner or pouring box set on top as shown. Large sink heads are employed and remarkable success is enjoyed by this foundry as it is a rare occurrence to lose one of these castings. The mixture usually employed for these castings is copper 85 and zinc 15 per cent.

After the cylinders are cast they are taken from the sand when sufficiently cold and the core is broken out. The casting is then sent to the machine shop where the risers and gates are cut off. It is then placed upon the lathe and turned off, both inside and out, until a fine, smooth surface is produced (see Fig. 2). The handling of one of these cylinders in the machine shop is an interesting operation and by no means an easy proposition. After the cylinder has been received by the paper mill it is drilled full of holes about ¼ in. in diameter and fitted with suction at one end, the other end being closed. When two of these rolls are placed in position in the paper mill, the pulp for finished paper is run over them and the sulphite water is sucked out leaving the pulp as dry as though it had been squeezed. This constitutes quite an improvement in the manufacture of paper.

Owing to the acid character of the liquids used in the paper-making process the composition of the metal with which the liquids come in contact, must be of a non-ferrous character. The mixture now in use by the Bethlehem Steel Company is said to be ideal for this purpose. Aside from the mere combination of copper and zinc mentioned above, a chemical alloy is also used in order to produce sound and homogenous alloys. The preparation and composition of this alloy is kept a secret by the company for obvious reasons.

Elaborate experiments are being continuously carried on at the foundry for the production of chemical alloys, phosphorus, silicon, manganese, calcium sodium, magnesium, vanadium and titanium are all used in varying extent as the occasion requires. Some extensive work has been done in microphotography as an aid to the production of castings of the highest quality as to texture and efficiency and also tensile strength and elastic limit. A recent achievement of this foundry was the casting of a brass cylinder used for a pump lining in a waterworks installation. This cylinder weighed 9,500 lbs. and had a tensile strength of over 40,000 lbs. per sq. inch. The foundry, as at present, is contained in a wooden building, but with the improvements now under way by the Bethlehem Steel Company, which require the expenditure of about $12,000, this will be changed and a substantial brick structure will replace the wood. The capacity of the foundry will also be largely increased and, therefore, a larger volume of business will be possible.

While the Bethlehem Steel Company are unique in being the only steel mill to have their own brass foundry, it must be remembered that they have exceptional facilities for handling castings of unwieldy size and enormous weight. By virtue of the magnificent machine shop the steel company are enabled to handle seemingly impossible combinations of metal, and this gives them a large advantage over their competitors. Two very important factors in the success of this branch of the steel business are the men whose portraits head this article. Chas. E. Ryberg is the active sales agent, and he has contributed largely to the development of the business by his energy in securing orders. Burton T. Moore, the superintendent of the foundry, has had an equal share, gained by his efficient management of the foundry, whereby he obtains maximum production with minimum expense and loss.

THE PLATING OF A LARGE WHEEL.

What would seem to be the largest single piece of work ever silver plated was recently completed by J. W. Force, of New Britain, Conn., at the works of the Ansco Company, Binghamton, N. Y., manufacturers of camera supplies. The article in question was a cast iron wheel 10 feet in diameter with a 4-foot face. The wheel was first plated with a heavy coat of copper. The copper plate was then polished off until a good smooth surface was obtained. The polishing was done by means of wheels covered with emery as well as by straps running over pulleys at the front and back, the friction being applied at the bottom of the wheel. The finishing was done with cotton buffs and also by clean cotton straps or belts charged with rouge, then washing in alkali, and finally rinsing and washing with clean water. The wheel was next run in cyanide of potassium solution and then in a quicking silver bath; this gave a thin film or coat of silver over the entire surface. Following this preliminary process came the real operation of plating.

A solution of silver was made carrying 6 ounces of silver to the gallon, and the wheel was plated in this until about three one-thousandths of an inch had been deposited. A specially constructed dynamo giving a current of 3 volts and a density of .25 amperes was used. The wheel was revolved at a speed of 2½ revolutions per minute throughout the whole process.

Among the Assyrians knives and long chisels or hatchets of bronze were among the objects found at Tel Sifr, in southern Babylonia. The earliest bronze image, according to the best authorities, dates back to 2100, B. C.

THE CHEMISTS' RELATION TO THE COPPER AND BRASS INDUSTRY.*

By Ernest A. Lewis.

(Continued from September.)

GUN METAL.

The commercial analysis of gun metal is simple, but the detailed accurate analysis is very complex. An ordinary analysis requires copper, tin, zinc, lead, and iron. 1 grm. is dissolved in 5 c.c. of nitric acid and 5 c.c. of water, the solution is evaporated until the sides of the beaker appear greasy, diluted to about 50 c.c. with hot water, allowed to stand, and the stannic oxide filtered off, and washed with hot water. For commercial analyses it can be ignited and weighed as stannic oxide, as it will not contain more than 0.2 per cent. copper. The copper and zinc are determined as in brass, the iron and lead on a separate sample, using from 3 to 5 grms., according to the amount of lead present. If an exact analysis is required the following must be looked for: copper, tin, antimony, arsenic, lead, iron, nickel, zinc, phosphorus, and sulphur. The copper, tin, and zinc are determined on 1 grm., but the small percentage of copper (and lead in gun metal containing over 2 per cent. of lead) must be determined, by fusing with about 2 grms. of a mixture of dry sodium carbonate and sulphur in equal parts, boiling with water, and filtering off the lead and copper sulphides which are then dried and ignited; the ash is dissolved in a few drops of nitric acid and diluted to 50 c.c. in a small beaker and electrolyzed. I use small electrodes of platinum foil. The copper and lead are calculated to oxide and deducted from the stannic oxide, the percentage of copper being added to the main bulk.

The percentage of antimony (which is counted as tin in commercial analyses) is determined on a separate 2 grm. lot. The impure tin oxide is fused with 2 grms. of sodium hydroxide in a silver crucible, the melt dissolved in water, the solution acidified with hydrochloric acid and the antimony is dissolved in 10 c.c. brominated hydrochloric acid and estimated by the bromate method (Chemical News, 95, No. 2462). The percentage of antimony is deducted from the percentage of tin; both oxides contain practically the same percentage of metal.

Arsenic is determined by distillation and the percentage calculated to arsenic oxide and deducted from the tin. Phosphorus is determined on a separate 5 grm. lot; the tin oxide is fused with potassium cyanide and the phosphorus obtained in solution.

If the lead exceeds 3 per cent., it is determined on a 2 grm. lot; the small amount carried down with the tin must be separated by fusion with sodium carbonate and sulphur, and the amount in solution from the lead sulphate precipitate must be estimated electrolytically. Iron is determined in the lead portion. Nickel may be present in small quantity and is separated as described under brass. Sulphur is very often present in quantity up to 0.2 per cent. It is determined by digesting 2 grms. with nitric acid, removing tin, evaporating to dryness with hydrochloric acid, and precipitating as barium sulphate. In the analysis of manganese bronzes, sterro-metal, etc., copper and zinc are determined on 1 grm., practically as described for brass, the only difference being that after evaporating the solution is made just alkaline with ammonia, then bromine is added until a deep red color appears, when the solution is allowed to stand for one hour, and boiled with excess of ammonia to precipitate iron and manganese; the zinc is estimated in the filtrate. Tin and lead are estimated as in brass, using 5 grms.

Manganese, iron, and aluminium are estimated in a 5 grm. lot, separating the tin as oxide, and copper with hydrogen sulphide or by electrolysis. The filtrate is evaporated to dryness, adding 4 c.c. of nitric acid towards the end; the residue is dissolved in HCl, and iron and aluminium separated by the acetate process; the acetate precipitate is dissolved in hydrochloric acid, and diluted to 250 c.c. In one lot of 100 c.c. the iron and aluminium are precipitated together with ammonia and the iron is titrated in another 100 c.c. The manganese is precipitated with ammonia after adding bromine in the usual way.

GERMAN SILVER.

For the accurate analysis of German silver 1 grm. is dissolved in nitric acid, and the copper separated by electrolysis as for brass. The solution containing nickel and zinc is evaporated to dryness, the residue taken up with water and a few drops of hydrochloric acid, transferred to a 500 c.c. beaker, a solution of sodium carbonate added till a decided precipitate forms, when 100 c.c glacial acetic acid are added; the bulk of the solution must not exceed 300 c.c. When perfectly cold, a stream of H_2S is passed through the solution for one hour at the rate of about 2 bubbles per second; the zinc precipitates as pure white zinc sulphide which can be filtered through 2 Swedish filters, washed with a solution of hydrogen sulphide, and weighed as sulphide. The nickel filtrate is evaporated with 20 c.c. of sulphuric acid till copious fumes are evolved, diluted, electrolyzed for nickel, after adding ammonia and 1 grm. of ammonium oxalate. The above separation is complete so long as the acetic acid solution is perfectly cold and saturated with hydrogen sulphide.

The small quantities of tin, lead, and iron are determined on a 10 grm. lot as for brass. The analysis of cupro-nickel for copper and nickel is best carried out by electrolysis, the copper being separated as under brass, using 0.8 grm., and the nickel in the solution. Nickel electrolyses should always be carried out in a sulphate solution containing ammonium sulphate and 1 grm. of ammonium oxalate. Supro-nickel coins usually contain 1 per cent. zinc, and are analysed as German silver.

SPECIAL ALLOYS.

Cupro-manganese is tested for copper, iron, and manganese, 1 grm. is dissolved in nitric acid and the copper separated by electrolysis. The small amount of manganese deposited on the spiral is dissolved in a few c.c. of hot hydrochloric acid, and added to the main bulk, the manganese and iron being separated by the acetate process.

Phosphor-copper is tested for copper and phosphorus. I grm. is dissolved in nitric acid and the copper separated by electrolysis, the phosphorus being separated by the magnesia process in the solution from the copper.

Silicon-copper is tested for copper and silicon. 1 grm. is dissolved in 10 c.c. of aqua regia, evaporated to dryness, and heated in an air bath to render silica

*From a paper read at Birmingham meeting of the Society of Chemical Industry.

insoluble; the residue is taken up with hydrochloric acid and filtered to remove silica, and the filtrate is evaporated with 10 c.c. of sulphuric acid till copious fumes are evolved and then electrolyzed for copper.

Aluminum bronzes—1 grm. is dissolved in nitric acid and the copper determined electrically; the aluminum is determined by precipitation with ammonia for technical purposes, the iron is not determined, as it is only present in small quantity. For its determination 5 grms. are dissolved in nitric acid and the copper separated by electrolysis or hydrogen sulphide; after evaporating the filtrate to dryness and oxidizing with nitric acid, the iron is separated by a double precipitation with sodium hydroxide and finally redissolved in hydrochloric acid and precipitated with ammonia.

Aluminum brass is ordinary brass containing 1 per cent. or 2 per cent. of aluminum. The aluminum is separated with ammonia, after separating copper. It is analyzed practically the same as ordinary brass.

Phosphor tin.—The only constituent required is the phosporus. 1 grm. is digested with 10 c.c. of nitric acid, the tin oxide and phosphorus are filtered off, dried, ignited and fused with potassium cyanide, the phosphorus being weighed as magnesium phosphate.

Ferro-zinc.—The only constituents required are iron and zinc. 10 grms. are dissolved in 90 c.c. of hydrochloric acid and 10 c.c. of nitric acid, and diluted to 500 c.c. The zinc is determined in 25 c.c. volumetrically and the iron in another 50 c.c. by bichromate of potassium.

WHITE METAL ALLOYS.

White metals may be divided into three groups: 1. The rich tin alloys. 2. The rich lead alloys. 3. The zinc alloys.

There is no satisfactory and simple method which can be applied to all these alloys. In the case of an unknown alloy, a qualitative test must precede the quantitative analysis. The method described by Fresenius is the most accurate; antimony is estimated by the bromate method. In the case of a Babbitt metal containing over 70 per cent. of tin, after getting a representative sample in fine powder, 1 grm. is digested with 6 c.c. of nitric acid and 6 c.c. of water, diluted, and the precipitate, which contains the whole of the tin and antimony, and a little copper and lead is filtered off. The filtrate is evaporated with 10 c.c. of sulphuric acid to remove lead, which is filtered off and weighed. The filtrate is electrolyzed for copper and any lead left in solution as for brass, the zinc being determined in the solution.

The precipitate of tin and antimony oxides is ignited and weighed, then fused with a mixture of dry sodium carbonate and sulphur, and the sulphides of copper and lead filtered off and determined as described under gun metal. The weights of copper and lead found are calculated to oxides and deducted from the tin and antimony oxides, as these latter contain the same percentages of metal. From the percentage of mixed metals found, the percentage of antimony found by the bromate method (Chemical News, page 95, No. 2462) is deducted, leaving the pure stannic oxide. The bromate method of antimony assay is very accurate; as much as 10 per cent. copper has no effect on it provided the solution after reduction with sodium sulphite is boiled long enough to reoxidize the copper. In the case of rich lead alloys, the oxide precipitate may contain 2 or 3 per cent. of lead, and in alloys containing zinc, some of it is nearly always found with the tin oxide. The potassium bromate standard solution must be kept in a well corked bottle, in the dark, and in a cool place, it must be standardized every week.

Bismuth occurs in small quantity up to 1 per cent. in some white metals; it may be separated with ammonium carbonate after removing the lead.

DISCUSSION.

At the conclusion of the reading the following discussion took place:

The chairman said similar standardization work was undertaken some years ago, as far as iron and steel were concerned, by a committee of the British Association, and although he believed no standard methods had been laid down, the investigation was a most useful one, as it had brought to light errors in processes that were in constant use in many laboratories. In agriculture—particularly in America—official methods of analysis had been laid down, and in this country, too, quite recently the Board of Agriculture had scheduled processes to be followed in the valuation of feeding stuffs and manures. As regards the uniform relative accuracy of the electrolytic method and the iodide method for the determination of copper, his personal experience was distinctly in favor of the former. The analysis proceeded automatically, and the turn of the balance did not permit the uncertainty that the returning color occasionally did in the volumetric method. Mr. Lewis stated that the presence of cadmium altered the fracture of the spelter. What was the least percentage present in the metal that could readily be detected by the eye of an experienced man?

Dr. T. S. Price said he did not consider one evaporation with hydrochloric acid sufficient to get rid of nitric acid; he always evaporated several times. Why were 250 c.c. of electrolytes used for the electrolysis of copper solutions? Now an essential principle in electrolytic analysis was to use as small a volume of electrolyte as possible in order to get out the last traces of copper. He thought 150 c.c. was plenty. Had the author accurately calibrated his measuring flasks, pipettes and burettes, and did he take those calibrations into account when doing his assay? If he did not, the iodide assay could not be as correct as the direct electrolytic analysis. Thiosulphate solution might keep well in a concentrated solution, but it did not keep in dilute solution, say a $N/50$ or $N/100$.

He (Dr. Price) also called attention to the modern apparatus in which the bottle was directly connected with the burette all the time. In the electrolytic assay of lead in fairly pure brass, to what temperature was it necessary to heat the lead peroxide formed, in order to drive off the water and get it of constant weight? He believed it was about 230° C. In regard to the suggestion of estimating nickel electrolytically from a solution containing ammonium oxalate he (Dr. Price) pointed out that in numerous papers it had been shown that carbon was always deposited with the nickel. The accurate method was to use a strongly ammoniated solution of the sulphate, ammonium sulphate being added to make the electrolyte conduct better. It was not even necessary to have the nickel present as sulphate, as had been recently shown; it could be present as nitrate or chloride, so long as the solution was strongly ammoniacal and contained ammonium sulphate.

Mr. J. M. Levy pointed out, in connection with the assay of copper materials at the smelters, that one generally required to know the percentage of copper very rapidly to control the furnace working.

(To be Continued.)

THE VALUATION OF ASH IN FUEL.

By Thomas Turner, M.Sc.*

All fuel users are aware that, even when the source of supply remains constant, there are frequent variations in the quality and suitabilty of the material which is received. The most obvious differences are those of size and of the proportion of accidental moisture due to rain, snow and similar causes. Coal is now sized much more carefully than was the case a few years ago, so that differences of this character are correspondingly less marked. The actual weight of water taken up by good, firm coal when it is wet is no doubt very appreciable, but on account of its obviousness this source of variation is probably rather over than under-estimated in many cases. The next cause of inferiority is that of an increase in the proportion of earthy matter or ash. This may be the result of local variations in the seam itself, the substitution of coal from another seam, or want of care during the getting or washing processes.

The estimation of ash in fuel is one of the simplest which the metallurgical chemist has to perform, the process merely involving the weighing of a suitable quantity of the coal to be tested, burning off the combustible matter, and then weighing the incombustible residue. There is one source of error inherent in the process, which, however, is not important. In some cases, as in the presence of iron pyrites, a constituent may alter in weight as a result of oxidation. The residue obtained therefore does not necessarily correspond exactly with the proportion of inorganic matter originally present in the fuel, but it does indicate the weight of ash which the fuel would yield provided combustion were complete. The greatest source of error in fuel determination is usually that due to the taking of the original sample. Honest, but inexperienced samplers often pick a few pieces here and there and thus provide the analyst with a specimen for analysis which is actually worse than useless, as it merely involves the expenditure of time and money to obtain a misleading result. But after the sampling has once been scientifically and properly done any person of average intelligence should be able in a very short time to ascertain the percentage of ash which the coal will yield.

Assuming that an accurate result has thus been obtained, the important question arises as to what allowance would be fair to make as between buyer and seller for any given variation in ash. Hitherto, no general standard has been agreed upon and, in case of dispute, the evidence on the one side has usually been that the consignment in question was ashy and inferior or rubbish, which would not burn, and which spoiled the metal. The other side would naturally claim the coal to be as good as usual, and fully worth the very moderate price paid. The object of the present article is to suggest for consideration a simple method of allowing for variations in ash content from a given standard. For this purpose it would not be possible or even necessary to compare fuels of different character. For example, if a blast furnace-manager orders hard coke, he does not wish to compare it with coal slack; nor would a person buying charcoal wish to compare its ash content with that of soft gas coke. It will, therefore, be assumed, as the basis of comparison, that the manufacturer is familiar with and wishes to obtain a particular kind of fuel which exactly suits his purpose. For such a fuel a standard price is also assumed, and any variations in quality have then to be taken into account.

Let it be granted, for instance, that a sample of coal contains 5 per cent. of ash. Another coal from a similar source, and of the same character, contains 6 per cent. of ash. By what proportion is the value of the second coal lowered as a result of the extra 1 per cent. of ash? In order to answer this question the effect of the presence of the extra ash may be considered under three heads:

1. In the first place it is evident that as the ash is a foreign, inert substance of no calorific value, we are perfectly safe in deducting its weight from the coal, and we thus start with an initial and easily determined deduction of 1 per cent. This is, however, the only simple and easily determined quality with which we have to do.

2. Secondly, this 1 per cent. of ash has had to be carried from the coal pit and handled at the works where it is used. The cost of carriage and handling may be very small if the colliery is near; or, if the fuel is bought carriage paid, a considerable part of the extra expense has already been included under the first head. But in some cases the carriage and handing of the fuel costs more than the purchase price of the fuel itself, and in such instances the adverse effect of the additional ash is very considerable. Evidently, therefore, no general rule can be laid down under this heading.

3. Thirdly, we have to do with the action of the ash of the fuel in the furnace. In a crucible or a reverberatory furnace the extra ash causes the formation of clinkers and so leads to lower temperatures, much extra labor from the furnace man, and additional cost in furnace bars, linings and crucibles. The ashes, too, have to be carted away, and usually also there is a charge for tipping. In a blast furnace the ash has to be fluxed away; hence additional flux is required, and additional fuel to melt the slag which is produced. The slag has afterwards to be handled and tipped.

It must be remembered also that the fall in temperature due to the action of the ash results in a money loss to the metallurgist which is far greater than is represented by the proportional fall itself. For example, if a temperature of 1200 deg. C. is required for a particular operation, no quantity of heat which only yields a temperature of 1150 deg. is of any practical use. The available margin with which we have to deal is that which is above, and not below, the fixed and necessary point. If, then, we require 1200 deg., and our fuel yields a maximum of 1600 deg., which is reduced to 1500 deg. by a small addition of ash, the metallurgist loses 25 per cent. of his available margin, though the loss for steam raising purposes may be much less than 25 per cent.

It will, therefore, be evident that no uniform and definite values can be given for these secondary effects of ash which will apply to all cases. Fortunately, however, we can appeal to experience as an aid to fixing the limit at which fuel ceases to have a commercial value for metallurgical purposes. Coals and cokes are not infrequently used with over 10 per cent. of ash, and even 20 per cent. has sometimes to be used. But when the ash is equal to one-third of the total weight of the fuel it will be generally acknowledged that the upper limit has been reached or even exceeded. Fuel such as this may be regarded as possessing no metallurgical value even at the pit's mouth. Hence, one part of ash represents not only a loss of value equal to its own weight, but it also diminishes the value of the fuel by twice its own weight. In other words, the diminution in the value of a fuel due to

*Professor University of Birmingham.

ash is approximately represented by three times the weight of that ash.

Applying this principle in practice to the case previously suggested, of the comparison between two similar coals, one of which contained 5 and the other 6 per cent. of ash, the value of the first will be in the proportion of 100 — (5 x 3), or 85; and of the second, 100 — (6 x 3), or 82, and if the first coal were worth 7s. 1d. per ton, the second would not be worth more than 6s. 10d. Or, to take another example, assuming a blast furnace coke to contain 8 per cent. of ash and to be worth 25s. per ton, what would be the value of another coke containing 5 per cent. of ash? The proportional values would be 100 — (8 x 3), or 76, and 100 — (5 x 3), or 85, and the value would be $\frac{25 \times 85}{76}$ shillings, or 27s. 11½d.

These calculations are as simple as possible in principle, but become a little troublesome when fractional values are involved. To obviate difficulty in that respect a diagram has been prepared, from which, at a glance, the proportional value of any two similar fuels, with known but different ash content, can be at once ascertained.

It is hoped that this method of allowing for the difference in value due to varying proportions of ash may commend itself to fuel users.

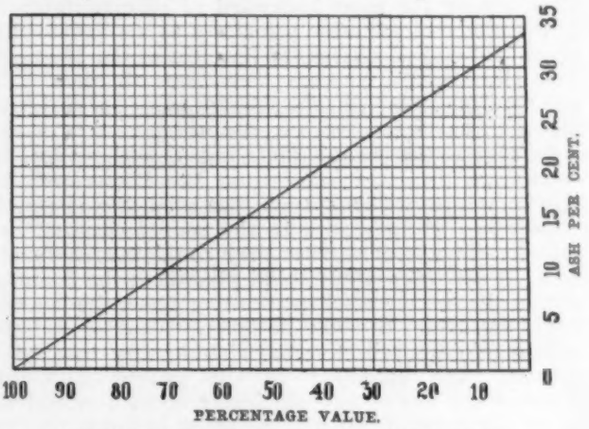


DIAGRAM FOR PROPORTIONATE VALUATION.

METALLURGY FOR JEWELERS.*

ENGLISH PRACTICE

COMPILED BY J. HORTON.

(Concluded from September.)

GILDED SURFACES.

One solution recommended by Mr. Mountford is as follows:

Gold dissolved in aqua regia; evaporate until only a crystalline mass of gold chloride is left when cooled and practically all free chlorine is driven off. Add water, stir up and precipitate with ammonium hydrate. After washing precipitate several times, boil for an hour, allow to settle, pour off water, and repeat the boiling with fresh water two or three times for about ten minutes. (This is to rid the precipitate of all free ammonia.) Then dissolve the precipitate with potassium cyanide in solution and boil slowly for an hour. (This will liberate any excess of ammonia.)

Mr. Mountford says that he made a great number of solutions by this method, but while they were quite satisfactory as ordinary solutions they were not so as bright ones. This fact caused him to reduce gradually the quantity of gold per gallon to two pennyweights, to increase the E.M.F. of the current, and to use at a higher temperature so as to reduce the resistance of the solution. The small percentage of gold tends to cause a more even deposit, while the higher voltage causes the gold to strike more quickly and tends also to keep the high finish. In gilding a bunch of work, the time of immersion would be two seconds or less—much less—a skilled worker knowing by the evolution of gas when sufficient gold has been deposited. With an E.M.F. of six volts and five amperes of current at a temperature of 180 degs. F. The solution should be tested every three days for free cyanide. The best method for this, Mr. Mountford considers to be the one devised by Mr. Baker. The amount of free cyanide with which to start a new solution is given as 15 dwts. per gallon. As the gilding solution gets older the free cyanide must be increased, owing to the increasing amount of gold in it. When it requires about 32 dwts. of free cyanide to get good results and the solution contains from 6 to 10 dwts. of gold per gallon, the deposit of gold loses its fresh color and it is then advisable instead of adding more cyanide to make a fresh solution, using the old one as an ordinary solution. The life of the bright solution is about a month and many thousands of articles may be gilded in it.

In this case, as in the case of coloring, the previous cleaning of the work is of the greatest importance. After the work has been polished it should be boiled well in weak soda water, then in clean water. Afterwards it should be washed out quickly, with soap of good quality, swilled and dried out in sawdust. It should then be gilded at once. The success of this series of operations depends to a great extent upon the quickness with which it is done. On no account should water be allowed to dry upon the work or there will be a dull film after gilding which only repolishing can take away.

Mr. Mountford adds a word or two as to the use of cadmium in gold solders. This metal, he says, enables the jeweler to use full quality solders for all alloys without materialy altering the composition; in other words, to take the same alloy for his solder as he does for the work, adding the cadmium and taking away an equal weight of solder or copper. This makes it possible to have three solders for each alloy, namely, easy-running, medium and hard, all to assay at full quality.

DISCUSSION.

The discussion on Mr. Mountford's paper brought out some interesting observations with regard, especially, to the use of copper in gold alloys, while the too exclusive insistence upon art as the main element of technical training in the jewelry trade was forcibly commented upon by the president, Mr. A. H. Hiorns. It was satisfactory to them, Mr. Hiorns remarked, to

*From T. J. Mountford's paper, read at Metallurgical Society meeting.

know that great developments had taken place in the jewelry trade, but it had struck him that the jewelers were among the most backward of all manufacturers in the study of scientific principles as applied to their trade. They had classes for jewelers at the Municipal Technical School, but very few came to them. The common impression in the jewelry trade seemed to be that art, not science, was the chief thing.

Of course, the jeweler could not do without art, but from what they had heard from Mr. Mountford they must come to the conclusion that science was equally important. With regard to the use of charcoal as a flux, he did not think that they could call charcoal a flux. If Mr. Mountford could give them the composition of the flux he used for running down the lemel, it might be useful to some of them. Another question which suggested itself was whether any method of agitation was employed in the gilding bath, and whether the use of any particular method would improve the color of the gold, or assist in promoting the efficiency of the brightening solution. One difficulty that had always existed as he well knew in making gold alloys was that of getting a sample of copper to suit them. The question why different samples of apparently pure copper acted so differently was one he had never been able to understand. There seemed to be here a chance for some enlightened members of the copper trade to introduce a new line of business.

Mr. F. Johnson's experience of copper in this connection had revealed the same difficulties. He had found that, while one manufacturer had complimented him on the copper, another speaking of the same copper had described it as "awful stuff" which he could not use. This applied to copper which proved to have a purity of 99.99 per cent. He, too, had heard from several quarters that Swedish wire copper was the most suitable for the jeweler. What he would like to know was what there was in the copper outside of the copper itself which gave this satisfactory application.

Mr. Mountford pointed out that the lemels from one place would not contain the same impurities as those from another, and so the ordinary fluxes would take up the copper and silver where used. One that would do the work practically without anything else was saltpetre or nitrate of potassium.

With regard to agitation in the gilding baths, Mr. Mountford described the process as being all agitation, for the work was scarcely in and out again before it was done.

Mr. Mountford stated that he was not altogether satisfied with the tests from electrolytic copper. Here again, the answer to a good many criticisms was that one seldom or never found a laboratory in a jeweler's factory. He did not think they would find one in Birmingham. Swedish copper did not come out so pure as electrolytic copper and other coppers that could be named. He thought that the work that had been done on the Swedish coppers had something to do with its suitability for jeweler's alloys.

Mr. Johnson added that the same idea with regard to the working had occurred to him. But, as a matter of fact, he had some pure copper made into wire, and had found just the same trouble. Therefore, he was afraid Mr. Mountford had not found, in the working, the solution of the problem.

Mr. Perry, as a jeweler, was inclined to think that the troubles they experienced were not always due to the copper or to the qualities of the metals used as alloys at all. The jewelry trade was, to a great extent, in the position of a workship in which the tools used were not of sufficiently good quality. For instance, often the ingots were old and not of first-class quality, and very often they had been so faultily made than an uneven contraction resulted when they were rolled in a bad edge and sometimes very deep splits in the edge. A great deal of trouble of that sort might be unfairly put down to the inferior quality of the copper or other alloys by those who had not taken notice of such defects.

Mr. Mountford's reply to this was that for a period of seven or eight years there was not a split ingot in the place. The president's suggestion thrown out to Mr. Johnson was that there might be one element present in the Swedish copper, say, arsenic, which made it superior to the other coppers. Mr. Johnson's reply was that he believed Swedish copper to be free from all impurities, even gold and silver, but the suggestion that the superiority was due to the working seemed to him rather far-fetched, because the effect of working the metal was lost as soon as the copper got into the pot. Mr. Rees asked whether worked copper was likely to contain any more copper oxide solutions, and if so would that be likely to have any effect on gold. Mr. Mountford said that another theory of his was that the oxides in the copper tended to make a good ingot.

ANCIENT HISTORY OF COPPER.

The word for copper appears really to have signified metal and was used in its generic sense long after iron was known. On account of the gradual transference of the word meaning metal from copper to iron as the latter became the predominant metal, it is hard to define the exact beginning of that period which we now term the bronze age.

Some relics point to the existence of a copper age in which the use of tin as an alloy in copper was unknown. In some parts of the world it was some time before the alloying of tin with copper to make it more readily fusible, and to increase its elasticity and hardness, was known. In Europe only a faint trace of a copper age is to be found, but in North America the Indians took the native copper and fashioned it into weapons and utensils long before the bronze age in Europe.

Practically all of the copper relics found are wrought, not cast. The art of casting appears to have been unknown, although the fact that the Indians knew that copper would melt is mentioned by DeChamplain, the founder of the city of Quebec, in 1610. If European civilization had not brought to America this knowledge of casting copper and its alloys, it undoubtedly would have been discovered later, as the art of manufacturing bronze was known at this time in Mexico and Peru.

MORE BRASS AT THE NORTH POLE.

In September THE METAL INDUSTRY published a note about "Brass at the North Pole," being a report of the daily press on how Cook in claiming that he had discovered the Pole, had established his "claim" with an American flag enclosed in a brass tube.

Since then Peary has come forward as the real discoverer of the North Pole, and while he does not state that he marked his discovery with brass, no doubt his instruments and a number of his appliances were made of this alloy. Therefore, brass in some form was surely represented at the discovery of the North Pole.

STANDARD SOLUTIONS FOR MANUFACTURING JEWELERS.

DETAILED INSTRUCTIONS FOR COMPOUNDING AND MANIPULATING.

BY OSCAR A. HILLMAN.

(Continued from September.)

The trade journals and technical papers have laid so much stress on the importance of thoroughly cleaning any article before attempting to color it, that any additional words would seem inopportune, were it not for the fact that almost all the apparently insurmountable difficulties that confront the colorer from day to day would be entirely obviated if the work would be properly cleaned before being immersed in the coloring solutions. The wash solutions should be made in as small quantities as possible, so that they can be renewed frequently without bringing the cost of maintaining them to an exorbitant figure.

THE WASH, POTASH AND "KALYE" SOLUTIONS.

Experience has taught that the wash best adapted to remove the polishing compositions, oil, etc. from jewelry, be it gold, silver or brass; is the old-fashioned one made by using about half a pound of soap and a pint of 26 deg. ammonia for each gallon of wash. The soap should be the well known fig soap, or any other mild brand; the hard alkaline ones must never be used as they tarnish the work, making it impossible to color it properly afterwards. As ammonia is very volatile, a supply must be kept on hand in a jug or bottle and added to the wash as required.

Caustic soda is now very seldom used to clean work before coloring, as caustic potash has proved far more efficient and practical.

The cleaning compound, "Kalye" is very rapidly winning favor with up-to-date colorers, in fact, it is, to a great extent, superseding the use of caustic potash on high-grade jewelry.

The strength of the potash or kalye dip must be governed by the quality and condition of the work to be cleaned; a lye that is sufficiently strong for all ordinary work is made by dissolving a pound of potash or kalye in two gallons of boiling water.

THE CYANIDE DIP.

A common practice among old colorers, is to dip all their work in a weak cyanide dip before immersing in the coloring bath, but as all the ordinary solutions contain a large amount of free cyanide, the dip is of no value and it is a waste of time and cyanide to use it. A cyanide dip, made by dissolving four ounces of cyanide in a gallon of cold water, is very effective in cleaning old jewelry that has become badly tarnished, but all discolored work should be refinished, not merely cleaned. The most economical way to clean very oily work, such as machine-made chain or work that has been drawn in oil, is to use an electric cleaner charged with caustic potash or "kalye."

THE CYANIDE OF COPPER SOLUTION.

So many uses have been found for cyanide of copper solution, that it is practically indispensable in a modern plating or coloring plant; no matter how small the establishment, or the class of work handled. A solution made by dissolving six ounces of cyanide of potassium and four ounces of cyanide of copper per gallon of boiling water, makes an ideal solution for all-around work, but as cyanide of copper is quite expensive and difficult to make without special apparatus, carbonate of copper is invariably used. When the carbonate is pure or even high grade the solution will yield as good deposits as when the cyanide of copper is used, but when the carbonate is of inferior quality, the solution must be doped before good, uniform deposits can be obtained.

Commercial carbonate of copper is made by slowly adding carbonate of soda to a hot, concentrated solution of sulphate of copper, until all the copper is precipitated as carbonate of copper, after which it is washed and dryed or sold in a plastic condition.

Sometimes, when the carbonate of copper has been carelessly made, it contains a large amount of carbonate of soda, or, sometimes, too little soda has been used and the result is that the carbonate of copper contains a quantity of sulphate of copper that has not been acted upon. An easy way to test the copper carbonate is to warm a little until thoroughly dry, then pour some muriatic acid on it; if a very lively effervescence ensues, it denotes the presence of free carbonate of soda, so a little bisulphite of soda should be used when making a solution with it. When the carbonate of copper settles in the acid like mud, it shows too little soda was used, so the remedy is to add carbonate of soda or more cyanide to the solution.

Although some platers recommend the use of both the carbonate and the bisulphite of soda in a copper solution, it is never necessary to use both at the same time, and it is best to use neither, if possible. When the copper solution is used to produce a dead base for the rose-gold finish, a little aqua ammonia, added to the solution each morning, will darken the tone of the deposit so a rich rose can be obtained with very little gold. When using cyanide copper solution, it must be borne in mind that cyanide has a strong affinity for copper, so a powerful E. M. F. must be used to overcome the affinity and charge the particles of copper positively, so they will flow to the negative cathode.

SULPHATE OF COPPER SOLUTIONS.

Sulphate of copper solutions should never be used to color jewelry with, as the copper deposit received from them is inferior to that obtained by using the cyanide, and jewelry that has been plated in an acid copper solution first and colored afterward, is very liable to tarnish or spot out.

(To be Continued.)

FLOW OF METALS.

The flow of metals under pressure, discovered somewhat more than 30 years ago, is the basis of the industry of the French Metallurgical Company, Paris, France, which makes tubes and sections by forcing cold copper, aluminum, zinc, etc., through suitable dies. The three machines now used have capacities of 1,000, 500 and 250 tons, respectively. The enormous pressure exerted by the machines is concentrated upon a small area, and this causes the metal to become more or less fluid, so that it can be given the desired form. Elaborate tests of the tubes before and after annealing, also when heated to various temperatures, have been recently made. Among other results, it has been shown that cold-drawn zinc tubes of equal strength may be substituted for ordinary lead pipes, and that the saving in cost would be from 25 to 45 per cent.

A NEW PROCESS FOR RAPIDLY OXIDIZING IRON AND STEEL.

By Alfred Pritchard.

During the past few years I have been called upon to produce a gun metal finish upon iron and steel, one that would stand the test of time without lacquering and a finish that is positively rust proof. After many untiring efforts I have succeeded in producing a gun metal finish upon iron and steel that meets all the above requirements. It can be applied to watch cases, machinists' tools and builders' hardware, etc. To obtain uniformity in tint and finish, the part must first be well brightened and polished. Hardened pieces as such will want a longer treatment than soft ones, and where it is advisable they ought to be annealed so as to facilitate the process.

ALFRED PRITCHARD.

The parts must be strictly free of any grease or oil and to obtain this, the bigger ones are to be put for ten or fifteen minutes into boiling caustic potash, smaller ones may be thoroughly potashed and scratch-brushed with a steel wheel. The workman ought to frequently wash his hands so as to preserve the parts from contact with any grease, as otherwise the whole work might be spoiled.

The solution is made as follows:

Nitric acid.....	3½	ounces
Hydrochloric acid	1¼	"
Copper sulphate.....	1	"
Perchloride of iron.....43		"

Add water to make 1¾ gallons, keep in a dark place and allow to stand for two weeks.

This solution is poisonous and must be kept in a cool and dark room, in a glass bottle with an air-tight glass stopper. Into a small bottle only so much is poured off as will probably be needed for covering lightly all the parts twice. The applying to the parts is best done indoors at a temperature of 50 to 70 degrees F. (the parts having the same temperature), and with a well-washed and squeezed sponge saturated with just enough solution as to leave an even coating without the possibility of the liquid running along them. The parts will at once take on a brownish hue, which will be a good sign for regular reaction on the part of the metal, and if this is not so the coating must be repeated, taking special care that the ends receive the same and even amount. When the water has evaporated the color will change to a blackish green without any streaks or darker spots. The sponge is then well rinsed and left in clear water until again needed.

The parts are now deposited on suitable trays of wire gauze in such a way as not to touch each other. The tray is placed in a box of proper size provided with a thermometer and an alcohol lamp at the bottom, with a cover or door easy to open. In this box they must be dried at a temperature of 95 to 105 degrees F. for twenty minutes, taking care that the heaviest pieces are lodged in the hottest place. The surface will now show a good coating of regular brown rust.

The trays are now taken out without touching the parts and left for five minutes to cool off. In the meantime the steaming box (of quite the same pattern as the one for drying) is prepared and heated by an alcohol lamp to a temperature of from 85 to 95 degrees F. The cool trays and parts are now placed in this hot box and its door shut. After five to eight minutes there will, as a rule, appear on the parts a light and even coating of moisture like a dew. This is a precipitation of moisture caused by the rapid change of temperature which the iron undergoes. Should this steaming not take place in five minutes, a flat pan with clean water may be placed over the alcohol lamp, so as to saturate the air with the necessary moisture which will then soon appear on the parts. Great care has to be taken not to get too much steam, because as soon as visible drops appear there will result blots in the coloring. This steaming is most important and must be well watched.

As soon as the proper degree is attained the trays are taken out without touching the parts and placed in the drying box in the same way as the first time and dried again at 95 to 105 degs. Fahr. for twenty minutes. The trays are then put into the boiling vessel, an iron receptacle of the same dimensions as the steaming box. The vessel is nearly filled with clean water and heated to boiling point before inserting the trays. The water has to be renewed occasionally and the vessel well rinsed. The parts being sunk in the water, it is kept boiling twenty minutes, then the trays are taken out and left to cool off, care being taken to shake off any drops adhering on the parts. The rust coating has now changed its nature and appears as a black dust (black oxide of iron).

This dust has now to be removed by taking each part from the tray and scratch brushing with a soft circular steel wire brush, rotating in the lathe at 150 to 250 revolutions per minute. Hollow parts, such as watch cases, etc., must be scratched with inside brushes, and as the parts have to be touched, it is very important that the workman has very clean hands. The parts will now have regained their former lustre, but with a gray or blackish tint; if it is not yet quite regular in this stage it is of no importance, as it will get equal by the succeeding treatment.

After scratching the parts are put on the trays in the same way as before and put through the same treatment once more as described, when the desired black color is obtained. After the final scratching the parts have to be placed in wire baskets with handles to undergo the important supplementary treatment which prevents a subsequent rusting (which spoils so many articles by their pitted appearance).

A suitable pan is heated with engine oil and heated slowly to boiling point; the baskets are then dropped for three to five minutes in the boiling oil and then put aside and left until next day without wiping off the oil. Then they are dried only with woolen cloths and lightly coated with fine neats-foot oil, after which they are sure never to rust. For economical use it is best to treat two lots of parts together so that when one is drying or in course of scratching the other lot is steaming or boiling, and vice versa.

The Hebrew Scriptures throw but little light on the subject of the metals. The word translated in our version brass, a compound of copper and zinc, would be more properly translated bronze, as for instance, where Moses is commanded to cast five sockets of brass for the pillars to carry the hangings at the tabernacle.

CLOISONNÉ ENAMELING.

By Winfield E. Dunham.

This kind of work, unlike the more staple line of enameling, treats of the enameling of flowers, scenery, birds and most any delicately colored object or study. The numerous shades of transparent enamel used today present the artistic enameler with a varied assortment conducive to the natural state.

Of course, the die from which the pieces are struck must be given no little consideration. It must not only be true to nature in its design but must present a uniform depth as well. There are many dies that give the enameler no end of trouble on account of some infinitely small defect or upheaval in its surface, therefore, it must be said that the success of the enameled surface depends largely on the successful cutting of the die.

Although this branch of enameling dates back hundreds of years, it may be said with due credit to our predecessors that this work today is far superior in its color effects, the modern enameler possessing more than the primary colors of ancient times. With most colors in this work it seems best to apply the colors directly to the stock of the piece which is to be enameled, as the colors can be blended with more uniformity, as the sky on the above illustration, the blue and yellow especially blending with great affinity. Other combinations such as dark transparent blue and transparent turquoise, transparent green and transparent yellow, and many other various colors of the opal, blend with equal uniformity.

CLOISONNÉ ENAMEL.

If, after these colors are blended and fired, we should like to strengthen their tone, the enamel may be applied again, but this time great care must be exercised not to spoil the blend. It often happens that the enameler in order to get certain shades, must put one color of enamel over another that is fired to get a certain shade of red; green, pink and a variety of opals are improved in this manner.

After the natural aspect has been obtained by these operations it is best to fill the entire enameled surface with coating of flux that has been ground to the same consistency as the colors that were applied. If, after firing, the surface does not seem to be entirely flush with the outside edge the same operation can be repeated.

The great peculiarity of transparent enamels, especially the delicate shades necessarily used in this kind of work, compels the manufacturer to use the metal silver as a base. Silver plate has also been used, but it has proven most impracticable for the best work, the many different firings playing havoc with the solder which unites the two metals. Gilding metal is used to some extent by some manufacturers, but has met with very little success, as there are very few shades that can be successfully applied, the greatest detriment to the enameler of gilding metal being the unfortunate use of flux. This enamel on silver is not only very beautiful in itself alone, but is, as before stated, the chief pigment in the blending of the more delicate shades. The many operations necessary in this kind of work, particularly the numerous firings, compel the manufacturer to make most of the large specimens of extra heavy stock; 14 gauge on silver seems to be the best adapted.

It is, therefore, obvious that the combined cost of labor and production on this kind of work place it in a class by itself. But as nice work in any branch is always appreciated, this kind of enameling is being more eagerly sought at the present time than any other class of enameled jewelry.

A COLOR METHOD OF ANALYZING OLD NICKEL PLATING SOLUTIONS.

By S. R. Mason.*

The hydrometer, although a useful and very necessary instrument in the plating room, fails to offer an accurate means of determining the content of nickel in solutions of the double salt (new solutions excepted). The reason for this is that the ammonium sulphate, which constitutes about 33 per cent. of double nickel salts, accumulates in the nickel solution, and thus increases the solution density. Thus it is conceivable that the hydrometer may show a high density in a solution where the amount of nickel may be small.

The following method offers a means of determining the amount of nickel in solution regardless of the amount of accumulated ammonium sulphate. The method offered is a colorometric one based on the fact that the color of nickel solutions grows deeper as the amount of nickel increases. Similar methods are in daily use in laboratories where rapid results are desired and great accuracy is not essential. The color method when used in connection with nickel solutions is accurate to 1/10 of one per cent., this having been ascertained by careful checking with standard gravimetric and volumetric methods. The method is carried out as follows: Two comparison tubes of the same capacity and dimensions are procured. These tubes should be graduated and have a capacity of about 50 cubic centimeters. Besides the tubes a box or "camera" is necessary. This may be purchased with tubes at any supply house of chemical apparatus. The "camera" or box is about 18 ins. long, about 4 ins. square on one end and 6 ins. on the other. The box is closed at the narrow end by a piece of ground glass, but is left open at the other end. A standard solution is also necessary, which is made by dissolving 12 ozs. double nickel salts in one gallon of water.

To analyze any nickel solution proceed as follows: Introduce 20 cc. of the solution to be analyzed in one graduated comparison tube and the same amount of standard solution in the other. The tubes are then placed in the camera by inserting them through holes just back of the ground glass. The operator, by placing the ground glass end toward the light and the other end close to his head will probably notice a difference in the density of green color in the comparison tubes. The more dense solution is diluted with water until it matches in color the solution in the other tube. For example, suppose standard solution was diluted with water until its volume was increased to 31 cc. before it matched the color in the other tube. Then it follows that the amount of nickel solution taken from tank is 20/31 of standard, or, 20/31 of 12 ozs. = 7.9 ozs. per gallon and should have added to it 4.1 ozs. of double salts per gallon to bring the nickel content up to the standard.

*Foreman metal finishing departments Western Electric Co., Chicago, Ill.

PLATINUM FUTURE IN COLOMBIA.

There is very great difficulty in making any forecasts of the probable future output of platinum from Colombia, not because the country is unexplored and unknown, as many reports state, for in the days of the Spanish régime the Choco was thoroughly exploited for gold.

EDITORIAL

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AMERICAN VERSUS ENGLISH CRUCIBLES.

With the introduction of the self-contained type of tilting crucible furnace with a melting capacity of from 400 to 1,000 pounds of metal, has come a demand for a crucible of sufficient size to meet the requirements. The conditions that such a crucible must fulfill are not nearly so exacting as for a crucible used in a pit fire. It does not have to withstand the rough treatment a pit fire crucible is subjected to. It is never taken from the furnace; once set in position it remains there until its life is spent. It must, of course, be sufficiently stout to withstand the pressure exerted on it by the melted metal. It must also contain enough plumbago to conduct the heat readily so as to conform to the faster melting conditions. In view of these requirements it does not seem as though it would be a difficult matter to produce a crucible that would have a reasonably long life.

There has long been a friendly rivalry existing between the crucible manufacturers of the United States and Great Britain, and up to the present time American manufacturers have not succeeded, so far as we know, in producing a crucible that will hold up quite so well as those made in England. Just why this is, is somewhat of a mystery. The manufacture of crucibles is not a complicated process; the principal secret of the business is the proper "mix," or proportion, of graphite and other refractory material used in the makeup of a pot. Different metals require different mixtures for the crucibles that are to contain them, and the ultimate success of the manufacturer in meeting these special requirements depends upon his skill and intelligence in making up his "mix."

At the present time there is a good demand for a crucible capable of holding four hundred pounds of metal and upwards. This crucible must have a reasonably long life; by this is meant it must endure long enough for the consumer to feel that he has gotten the value out of it. We would not attempt to set a limit for the life of such a crucible, but it seems that somewhere between 40 and 60 heats is a fair estimate, based on varying conditions, as kind of metal melted, the character of furnace, kind of fuel used and strength of air or steam pressure. It is an undisputed fact that a crucible in a furnace of the type under discussion fired with coal or coke will last longer than in one fired with gas or oil. The reasons for this are obvious and need not be discussed here.

Now with all the conditions being equalized, there does not seem to be any good reason why an American pot will not hold up just as well as an English one, but the facts are these. A case has come to our notice where a thorough trial for comparison between the makes of the two countries was made. The English pots made an

actual endurance average of 47 heats per pot, while one American pot failed at its tenth heat, and another of a different make at its ninth heat. The conditions were exactly the same, the same mixture and charge of metal, yet there was a distinct deteriative difference in the conduct of the pots. In the same type of furnace English crucibles have run for 80 heats and over, where an American pot did no better than 30 odd.

Now, the American manufacturers were furnished with samples of the English crucibles, they knew perfectly well the conditions existing, yet they failed signally to produce a satisfactory article. What is the reason? Do they really want to make as good a pot, and fail through no fault of their own, or for politic reasons, do they consider that the standard is set too high and do not care to meet it?

An expert metallurgist and user of all kinds of pots has this to say in this connection: "The American pots resist the penetration of the heat of fuel and of the air currents at least 50 per cent. more than the English pots, and retard the culmination of the melting heat fully as much, if not more, and go to pieces all at once; in fact, are destroyed by their own non-conductivity. They are virtually destroyed chemically because the proportion of refractory clay to pure graphite is so great that the latter is so completely disseminated among particles of clay as to invite a greater opportunity for decarbonization, hence destruction, than if the graphite was in larger proportion, consequently less disseminated, and offering less resistance to the melting power of the heat rays.

"Now, crucible makers may not agree with this theory that greater power of convection will prolong the life of the crucible; evidently they do not, or they would not continue to fail so conspicuously. If they do not agree it offers a good opening for an interesting scientific controversy."

One of the explanations that may be put forward is that hitherto the requirements for a crucible demanded that it stand the rough treatment incidental to a pit furnace; it therefore had to be somewhat elastic under heat, while at the same time its size was comparatively small and so many heats were not required or expected.

Now, with the advent of the "non-lift-out" crucible furnace, more is expected, and as in the case of English pots is actually experienced. Possibly the American makers are not yet sufficiently versed in the new conditions to produce the required crucible. Possibly there is a difference in the mode of forming up of the pot. The American practice is to take a weighed amount of the previously prepared crucible "mix" and place the lump on the bottom of the mold set on a revolving wheel. A long arm or former is then let down into the mold, and gradually moves over to the side of the mold and rising at the same time. This pushes or squeezes the material to the sides of the mold and forms the pot. The crucible is made in the one operation, and "slicked" off by hand. It is suggested that the English practice is to form up in concentric layers, by using small portions of mix at a time. Of this we are not certain, but on fracture the two crucibles show a different structure, whether due to mechanical treatment or composition it is not possible to say at this writing.

Another supposition might be that American makers use too large a percentage of ground-up old pots, or graphite that has partially lost its identity and heat conducting qualities, so that upon analysis (chemical) while both crucibles might show the same relative proportion of carbon, the one with the old and used material would not necessarily be so good as one without but made of all new stock. This is an interesting subject and THE METAL INDUSTRY would be glad to hear from its readers on the matter.

PUBLIC OPINION.

The opinion of the public as expressed in the CRITICISM AND COMMENT columns of THE METAL INDUSTRY is very frequently the means of bringing out the salient and important points of a problem. In other words, it breeds DISCUSSION, and DISCUSSION in its turn is the life of ARGUMENT. ARGUMENT along scientific and yet practical lines is what we want and is what THE METAL INDUSTRY stands for.

A man may write an article and feel secure in his own mind that it is going to be readily understood. Some one may write a criticism of it, calling his attention to some little oversight, and the discussion which follows may become at once interesting and valuable to those who otherwise might have passed the article by with a perfunctory perusal. No one is yet so wise that he cannot profit by somebody else's experiences. So the more discussion there is on any particular subject the more can be learned about it. We call attention to the discussions in our CRITICISM AND COMMENT DEPARTMENT. These are interesting from two standpoints: one that our readers are on the alert and are quick to detect points in articles that are not quite clear; the other that valuable information is given on the various subjects involved. Therefore let us have DISCUSSION and still more DISCUSSION.

NEW BOOKS

"THE BRASS INDUSTRY" by Wm. G. Lathrop. A study of the origin and development of the brass industry in the Naugatuck Valley of the State of Connecticut. Size 7½ x 5½ inches, 143 pages, 16 portraits. Price $1.00. Published and copyrighted by Wm. G. Lathrop, Shelton, Conn. For sale by The Metal Industry.

This book will appeal to every one who is interested in reading of the establishment and development of the brass industry in Connecticut. It is historical rather than technical, for the author makes the common mistake of most text-books in mentioning that the "molten metal is poured into molds or run into pigs between marble slabs"—a practice which has been abandoned many years ago for iron molds. The historical end, however, has every evidence of being carefully prepared, and the book contains in a single volume a complete description of the Connecticut brass industry from the small beginnings and independence in Colonial times down to tremendous plants and competition and combination of the present day. Heretofore, the only history of this industry was in a few chapters of books relating to historical or commercial subjects. Mr. Lathrop gives a very complete account of all the individuals, firms and organizations who have taken a part in Connecticut's brass industry, and also presents half-tone engravings of the founders. The book contains statistics of production and particulars of the market for the product and is indexed. Due credit is given to the many authorities from which the work was compiled. "THE BRASS INDUSTRY" is a book which is valuable for reference as well as for general reading.

ELECTRO-GALVANIZING PROCESS.

To the Editor of THE METAL INDUSTRY:

Referring to the short article entitled "Cold Process of Electro-Galvanizing" which appears on page 334 of your September issue, the author, Wm. Schneider, invites criticism of his alleged new process. I would ignore the invitation were it not that, appearing in your paper, it has been given wide circulation and may do much harm to cold galvanizing by the misinformation which it conveys.

I admit that from my first perusal of the article I gathered the impression that Mr. Schneider was joking. If he was not, I must, before all, pay tribute to his modesty. He writes: "I would like to suggest a cold galvanizing solution which I have no doubt surpasses any of those being used by the trade in general;" and again: "and is doubtless superior to any of the present-day methods of accomplishing this end."

The author claims that the process is entirely unlike previous methods and no longer depends on the dissolving of the zinc anodes to keep the electrolyte in good working order, and yet, further on, he says that it is imperative that pure zinc anodes be used. Purity being the antithesis of dissolute conduct, I suppose this is the philosophic basis of the scheme. We are not informed how the anodes succeed in keeping their hands folded and their eyes lowered and we must assume that when the solution runs out of zinc, zinc sulfate is added.

There are many successful plants running without zinc anodes, using regenerators instead. As regards the purity of the anodes, not only is iron (the principal impurity in zinc) not harmful, but it has even been recommended as an addition to zinc baths and a hard-zinc anode dissolves more readily than one made of pure metal, there being no evidence of iron being carried over with the zinc.

The agitation of the work will, of course, increase the speed of deposition and will be specially useful in connection with the anemic solution proposed by the author of the article, but as the devices referred to are usually for the purpose of agitating the *solution*, I presume that this is what he meant—in the end *es ist alles Wurst*.

The suggested solution is an old, old friend of ours, a pioneer, and still with us; indeed, the addition of sulphates of metals which are electro-negative to zinc—aluminum, for instance—is almost as old as the art itself; the use of glycerine is ancient history. Strangely enough, novelty is not claimed for the addition of glue or dextrine, but to call them "reagents" is an unusually happy misnomer, as they are perfectly inert in themselves, retard ionic convection and only give luster because they plate out to a very slight extent by entanglement with the zinc, so they say.

The point which is most liable to injure the growing reputation of electro-galvanizing is the author's recommendation: "E. M. F.—10 amperes to one square foot of surface," an hydraulic equivalent of which would be: "Pressure—10 gallons per square foot." Why not? Did they not sell furniture by the yard at Harrisburg? But, seriously, is it not dangerous for anyone who confounds electro-motive force with current-density to "monkey" with electrical machinery?—I was thinking about the safety of the machinery.

Let me hasten to assure the uninitiated that a current-density of 10 amperes per square foot in zinc-plating is, as far as I know, surpassed by the meanest of the solutions "used by the trade in general." For my part, I would feel very sad, and would "investigate," if I couldn't get 50 amperes per square foot through the solution which I use and 60 to 70 are being put through under specially favorable conditions. Instead of the old-time "lick and promise" you can nowadays lay on a coating in which you can plant pins and which you can pare off in chunks, but most wonderful of all, you can even satisfy "ye antient inspectour" with his sulfate of copper dip, in which, as the very late Earl of Sandwich said "Iron changeth to fyne Golde."

ALFRED SANG.

Paris, Sept. 25, 1909.

The author of the article that Mr. Sang criticises is a practical plater of many years experience and wrote up his process as he had employed it. We have no doubt but that Mr. Schneider will be glad to answer our correspondent and explain any seeming contradictions and discrepancies.—Ed.

AMALGAMATED BATTERY ZINCS.

To the Editor of THE METAL INDUSTRY:

As your METAL INDUSTRY seems to me to be the nearest to my business and impresses me the most of any of the trade journals (while they all help us). I notice a question put and not answered in the September issue, so I offer you this criticism, not for the benefit of one reader, but for all. I should be glad to have you publish it if you deem it worthy of a place in your next issue. The question that I wish to touch upon is the one regarding the preparation of zinc for batteries. I do not wish to get into an argument over the matter, but simply to make an effort to assist some one desiring the knowledge. The answer given to the question mentioned relates to the immersion process, and the criticism that I would make regarding the difference between the immersion and the amalgamation process is as follows: The immersion process is simply a dip and only on the surface, and, therefore, does not resist the action of the acid very long. With the use or aid of the mercury, as given in the process below, the life of the zinc is prolonged much longer and is still effective until the amalgamated zinc is no thicker than a small coin. My process for preparing amalgamated zinc follows:

HOW TO PREPARE AMALGAM FOR BATTERY ZINCS.

To make good battery zincs, do not use a cheap grade of zinc or any kind of remelted metal called zinc. Get a good brand of zinc from a reputable dealer in metals. A crucible furnace is not the best for this operation. Use a blacksmith's forge, or some furnace with a hood, so that the operator does not inhale the fumes of the melted amalgam.

Weigh equal proportions of zinc, to that which you have of mercury. Melt the zinc in a crucible (plumbago) and watch it carefully until it becomes "mushy," do not let it get any degree of red hot.

A piece of ⅜ or ½-inch machine steel should be used as a stirrer. As soon as the metal begins to melt, stir it. Take a small quantity of mercury in a four-ounce bottle, and pour into the melted zinc, and stir vigorously. Should this operation cause a lot of smoke and unpleasant fumes, it shows the zinc is too hot and must be cooled down with additional zinc. Repeat the operation of adding mercury and continually stirring while doing so until all your mercury is used.

When the amalgam is mixed it must be kept stirred to keep it in fusion. Get a small ladle or iron dipper to suit the crucible. Use a flat iron pan, with turned up edges, and in this "spill" or "splash" the mixture into flat cakes, and it "sets" readily. Then empty the pan and continue the dipping until the amalgam is all taken from the crucible.

We have now equal parts of mercury and zinc in solid metal. Of this amalgam we can now use 3 per cent., 5 per cent., 7 per cent. or 10 per cent. to the zinc when making battery zincs. For instance, say we are going to make some battery zincs, we take 16 lbs. of zinc and melt in a crucible then take 10 per cent. of this (already mixed amalgam) and add to the melted zinc. This is thoroughly mixed and there is no further process of dipping or rubbing on required. As for reducing the amalgam to a powder there is no need of that, simply drop it into the bath of zinc and stir. My stock of amalgam was made every day, but for any one who felt that way, it could be kept in a jar. Great care should be taken by

the person employed in this work. To inhale the fumes of the mercury means loss of the teeth, inflamed or poisoned gums, injury to the eyes and limbs. With common sense and a little judgment used, there is no danger to the man whose business demanded this metal.

Bridgeport, Conn., Sept. 24, 1909. JAMES SAVAGE.

DEOXIDIZERS.

To the Editor of THE METAL INDUSTRY:

In your editorial note to my letter on Deoxidizers you miss the point altogether. It is possible to have oxides and the deoxidizer used existing together in the same casting. It is not a case of too much or too little deoxidizer. It has been assumed that deoxidizers have a greater affinity for oxygen than the metal they are put in, but it has never been proved. Chemical theory says that copper arsenide and copper oxide cannot exist together in molten copper, but every copper chemist knows they do.

I hope to be able to prove experimentally, before long, that the theory that phosphorus reduces oxides in gun metal is altogether wrong.

Birmingham ,Sept. 27, 1909. ERNEST A. LEWIS.

We do not think we missed the point of Mr. Lewis's remarks, when we stated that, in the case of phosphorus if more than was necessary for deoxidation was used, phosphides were formed. It is entirely possible for phosphide or arsenide of copper to exist with copper oxide in the same casting. If copper containing arsenic should be melted, copper oxide is readily formed and this condition is fulfilled. On the other hand, if pure copper is melted and heated with more than enough phosphorus to prevent oxidation, phosphoride of copper will be formed. This metal being remelted and untreated or not sufficiently treated with phosphorus, a casting will result containing both phosphide and oxide of copper. This condition is revealed when tested chemically.

As it is a very difficult matter to accurately gauge the correct amount of phosphorus to add, the above condition is frequently met with. This is especially true when scrap once treated is remelted with new metal or when phosphor copper is used, where its definite composition is not known, we do not see, however, that this proves that phosphorus and other elements are not deoxidizers in the strict sense of the word. We shall be glad to get the results of Mr. Lewis's experiments on gun metal, and meanwhile would be glad to hear from some of our readers on the subject.—ED.

PHOSPHORIZING METALS.

To the Editor of THE METAL INDUSTRY:

In your September issue we notice an article by Burton T. Moore on the method of phosphorizing metals. In the sketch given, it shows that the mixture of magnesium and iron have filtered down between the cakes of phosphorus and has a generous layer on top. This appears to be a great deal more than the four ounces per 100 pounds mentioned in the text. We want to know whether this would interfere with the proper operation of the project?

Sept. 27, 1909. PHOSPHORIZER.

The sketch of the crucible which accompanied Mr. Moore's article on the phosphorizing of metals is not entirely accurate. The picture was intended to represent merely graphically and not the actual proportionate amounts of the ingredients used in the process. Four ounces of magnesium-iron mixture to the hundred pounds of copper is correct and our artist simply left off a few cakes of phosphorus because probably dots were easier to make.—Ed.

BEARING METALS WITH 20% LEAD.

To the Editor of THE METAL INDUSTRY:

In reading your September number, I would say that I am surprised to see these articles upon bearing metals containing 20 or more per cent. of lead. Eighteen years ago while I was employed as brass foundry foreman at the Cooke Works, locomotive builders at Paterson, New Jersey, but now of the American Locomotive Company, I used at least 20 tons of metal containing 20 to 22 per cent. lead as shown upon analysis. The metal that was used was made by the Damascus Bronze Company of Alleghany, Pa., and they will testify to the truth of this statement. I am at present engaged as a foreman for a large metal manufacturing concern and I claim to be able to carry as much lead in a bronze mixture as any man in the country today.

Newark, N. J., Sept. 16, 1909. JOHN J. CANNING.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

ALLOYING

Q.—I am in need of a formula for alloying fine gold to produce a metal that will have the color of platinum and will stand working. I caught the color with nickel but the metal is too hard to work. This should also stand the acid test for gold.

A.—Cobalt is the only metal outside of nickel that will prove satisfactory for your purpose. This can be added in the same proportions as nickel, will give a good platinum color when used in the proportion of 5 to 10 per cent. with fine gold. Another alloy could consist of iron 2 per cent. cobalt or nickel 3 per cent. or iron 4 per cent. cobalt or nickel 6 per cent. In melting, the gold should first be brought to the proper temperature and the iron added in the form of wire, and afterwards the cobalt or nickel. Chloride of ammonia will prove a good flux with these alloys. —J. L. J.

Q.—Please give us a formula for nickel bronze, and any other information in regard to the metal will be greatly appreciated.

A.—There is no real nickel bronze mixture that we know of in use today. The common form that might be called nickel bronze, but which is really a German silver, containing a small percentage of tin has been used with some success, where a stiff, hard spongy metal having the whiteness of silver is desired. A mixture for this purpose would consist (out of the crucible) of:

Copper	54	parts
Zinc	24.5	"
Nickel	20.5	"
Tin	1	"

All the precautions attendant upon the mixing and melting of German silver should, of course, be observed in the preparation of this alloy. The tin is added after the crucible has been withdrawn from the fire, and after a thorough stirring the metal is skimmed clear, and is then ready for pouring. In case you are not prepared to melt this metal yourself it might be well to communicate with a concern that makes a specialty of it.

Another mixture known as cupronickel bronze consists of:

Copper	60
Nickel	39
Titanium	1

There is a metal now upon the market called "Monel" which is practically a natural German silver, that is an ore containing copper and nickel in varying quantities, is used and so smelted as to produce an alloy consisting of:

Nickel	70
Copper	30

—K.

CASTING

Q.—We send you a zinc faucet, that we are attempting to cast in an iron mold with a steel core. We are having trouble on account of the castings cracking as they come out of the mold.

A.—It is customary for the makers of statuettes and other slush mold work that is liable to crack to use the highest grade of zinc obtainable. We recommend you to try Horse-Head or Golden-Rod brand. If cracking continues you will have to make your core in several parts so that when the key is removed it will at once collapse and allow the casting to shrink freely.—J. L. J.

COLORING

Q.—Would like to have you give me a formula for coloring glass red or any color.

A.—The method used in coloring glass such as incandescent lamp bulbs is as follows:

Any aniline color soluble in alcohol is used, the coloring matter is usually prepared as concentrated as possible. Then added to amyl acetate collodion, this consists of 6 ozs. of soluble cotton dissolved in one gallon of amyl acetate, otherwise the regular transparent dip lacquer. The glass is immersed in the colored dip lacquer and then allowed to drain until dry. A few of the colors are aniline blue, nile green and aniline violet and the various reds.—C. H. P.

DEPOSITING

Q.—I am having trouble with steel facing. I use one pound of salammoniac to each gallon of water and soft iron anodes. I do not seem to get a lasting coating of steel.

A.—You would probably obtain better results if your bath was prepared from the double sulphate of iron and ammonia in the proportion of 1¾ pounds to each gallon of water, and then add 1 to 2 ounces of ammonium citrate. It is oftentimes an advantage to cover the solution with a thin coating of glycerine to prevent oxidization. Your present solution probably contains too little metal, the hydrogen depositing with the metal probably causes the deposit to come off when used a few times. The solution must be maintained neutral, when it becomes acid, add carbonate of iron. Use mild iron for anodes.—C. H. P.

FINISHING

Q.—Could you tell me how to put a purple finish on brass?

A.—To produce the purple color upon brass prepare a solution as follows:

Hyposulphite of soda	3½	ozs.
Acetate of lead	3½	"
Hot water	1	gal.

Immerse the cleansed articles in the solution for 25 or 30 seconds, then remove and wash. If the tone is not deep enough, immerse in a very dilute solution of muriatic acid not over 1% or 1 part acid and 99 parts water. The articles should be lacquered to preserve the color.—C. H. P.

GOLDPLATING

Q.—I want a formula for rose gold solution that will produce a pink tint, and also stand the acid tests.

A.—To produce a rose gold solution for your purpose proceed as follows:

Dissolve ½ oz. pure 24 kt. gold in aqua regia (3 parts hydrochloric acid, one part nitric acid) use about 4 ozs. of the mixed acid for the purpose, heat the acid in a hot water bath or other method. After the gold is all dissolved add water and precipitate with strong ammonia, when all the gold is precipitated as a fulminate wash carefully by filtration. Then prepare 2 gallons of cyanide solution by adding sufficient cyanide to reach about 3 degrees Baume, then add the gold fulminate, now dissolve in the solution 4 ozs. of hyposulphate of soda and it is ready for use.

Use anodes of 24 kt. and a good strong current for a few seconds. If your articles are made of brass it is advisable to produce on the surface what is known as the rose rust. This solution is prepared by dissolving 4 ozs. of sulphate of copper in 8 ozs. muriatic acid and adding 2 ozs. of hot water, immerse the articles in the solution for a few minutes then remove, a rose effect will be produced, now relieve the high light and gild in the bath mentioned.—C. H. P.

LIQUATING

Q.—I send you a sample of a brass casting. You will note a round hole in it, where a small piece of metal came out. Can you tell me why this is? It is only lately since we changed our copper that this has happened.

A.—The trouble you mention is due to liquation. The addition of one pound of 30 per cent. manganese copper to your mixture is recommended. The manganese will tend to set the metal before liquation can take place. It is suggested that the copper you formerly used may have contained arsenic (many brands of Lake copper do) and this arsenic prevented liquation.—J. L. J.

MIXING

Q.—Can you give me a mixture for yellow brass that comes from the mold with a copper color skin, but turns up nice and yellow to match brass tubing and is soft in turning. I am using clean brass scrap and a small piece of aluminum to run it but it comes porous and some pin holes on the top side. I know of a company that uses sheet brass scrap and punchings and get this red color on the outside and I should like very much to get the mixture.

A.—In order to get the copper color skin on your castings you will have to omit the aluminum and obtain the necessary fluidity by the use of tin. The following mixture casts and machines well.

Copper	70
Zinc	24
Lead	3
Tin	3

You can make this mixture from sheet brass scrap and punchings by adding the necessary lead and tin. The red color on the surface of the castings is due to a superficial oxidation and you will have no difficulty in obtaining it if no aluminum is present.—J. L. J.

OXIDIZING

Q.—In oxidizing copper I do not get a deep lustrous black. I use 1 to 1½ ounces liver of sulphur to gallon of water. Can you suggest a good method?

A.—In oxidizing copper use a cold solution and do not allow the oxide to form too rapidly. A very small quantity of water of ammonia may be added to the solution. The secret of a good color is in developing the color slowly, and when brushing use a soft, fine, wire scratch brush and do the brushing dry.

The best results are obtained upon copper deposit produced from the acid copper solution.—C. H. P.

Q.—Can you give me a formula that will oxidize brass, also an old brass finish.

A.—For oxidizing brass for antique work or a black finish the following formula gives excellent results:

Water ammonia 26 per cent	1 gal.
Dry carbonate of copper	½ lb.
Salsoda	½ lb.
Warm water	½ gal.

Prepare the solution as follows:—Dissolve the copper in the ammonia and mix well, then the soda in the water and mix with the copper and ammonia. Acid dip or polish and clean articles in the usual manner, then in the oxidize dip until black, remove, wash well and then pass through a regular potash bath for one or two seconds to set the black, wash and relieve with pumice stone or on a regular buff, first drying out the articles.

For an old brass finish, cut down your brass goods in the regular manner, cleanse from grease, then scratch brush with an old worn brass wire brush, using a little pumice stone moistened with water applied to the brush, go over the articles lightly to produce a dead finish, then wash, dry out and lacquer with an old brass finish lacquer.—C. H. P.

PLATING

Q.—Will you please tell me how to do away with black streaks on plated zinc sheets? I have been using ammonium acetate for this purpose and would like to know if there is anything better to use.

A.—Black streaks are frequently due to a slight acidity of the bath or too weak a current. Not knowing the composition of your bath we are unable to give as much information as we

would like to do. Potassium citrate is oftentimes used for this purpose; if you find that ammonium acetate answers your purpose we would advise you to continue its use. Many platers nickeling zinc experience the same trouble as you do and overcome it by the use of either one or the other salts.—C. H. P.

POLISHING

Q.—Will you please publish something relating to the composition of jewelers' lapp wheels?

A.—Lapp wheels are made of various materials, such as antimonial lead and bronze alloys. After the wheels have been fixed on a spindle and turned true they are charged with a mixture of Turkish emery and whale oil, with agate lapp stone, as usual. Some lappers claim that wheels made from plastic bronze are the best, as the large content of the lead gives the wheel a lubricated feeling that keeps the article to be lapped from getting hot enough to discolor it. As a lapp wheel lasts for a lifetime if used properly, it seems as though the demand for them would be very light and detailed instructions for making them of very little interest.—O. A. H.

RECLAIMING

Q.—How can I recover the silver from the fire acid dip, so that it can be melted for use again?

A.—If your chloride of silver is pure it would be more satisfactory to sell it to silver platers, that is if it does not contain too much copper. If you understand anything at all as far as melting goes you could recover the silver in the metallic form from the chloride. For successful melting a flux is necessary, the following formula is excellent:

Soda ash	8 lbs.
Fused borax	2 "
Sea sand	1 lb.
Fluor spar	½ lb.

Mix thoroughly together and in melting use one part of the flux and one part of the silver chloride by weight, melt in a clean graphite crucible, when melted pour into ingots or in water if granulated silver is required.—C. H. P.

RECOVERING

Q.—Will you kindly let me know how to throw down an old cyanide gold solution, also how to throw down a yellow prussiate of potash solution, so I can get out the gold that remains.

A.—There are several methods for recovering gold from solution. The following methods have proved satisfactory:

No. 1. Evaporate the bath to dryness, then mix the residue with litharge and fuse the mixture in a graphite crucible used for the purpose, using the proper temperature for melting. The gold will be found in the lead button in the crucible after melting. The lead is dissolved by the aid of nitric acid. The gold remaining undissolved in the metallic state may be filtered from the lead nitrate, washed and used again in the usual manner.

No. 2. Add muriatic acid to the solution as long as a precipitate is obtained, using care in disposing of the fumes, which consist of hydrocyanic acid gas and are very poisonous. Filter the precipitate and wash well. Now boil the precipitate in aqua regia. If the solution contains some copper and silver the copper will be dissolved with the gold-forming chlorides of these metals; the silver remains undissolved and can be removed by filtering. Evaporate the solution containing the gold nearly to dryness to remove the excess of acid, then dissolve the residue in a small amount of water; add a concentrated solution of sulphate of iron as long as the brown precipitate is formed, which is metallic gold. The copper remains in solution and may be refiltered from the gold in the usual manner.—C. H. P.

SOLDERING

Q.—Will you kindly give us a formula for making fusible metal for soldering links together, for fire doors, etc., where not more than 10 lbs. tesel strength is required, that will surely melt at about 130 degs. Fahr.?

A.—Lipowitzs' alloy, which has a melting point of 158 degs. Fahr., begins to soften at about the temperature you require, and will probably answer for your work. It consists of:

Cadmium	3 parts
Lead	8 "
Tin	4 "
Bismuth	15 "

This alloy has considerable strength at ordinary temperature, and has been used for soldering britannia metal.—J. L. J.

Q.—Will you kindly give me the formula for making solder which is used in silver factories for soldering britannia metal?

A.—The solder that is commonly used for britannia metal consists of tin 2 parts, lead 1 part. Chloride of zinc or rosin is used as a flux.—J. L. J.

SPOTTING OUT

Q.—I am sending you a buckle, which has black spots. These seemed to come out after the buckle was finished.

1. What is the cause of the spots?
2. Can they be removed and how?
3. What is the metal mixture of the buckle?
4. How is it finished to get the color?
5. What kind of lacquer is used?

A.—No. 1.—The black spots upon the buckle are due to the metal being very porous in that particular spot. When the buckles were immersed in the potash and acid dips, the solution became impregnated in the pores and was not thoroughly removed by boiling in water.

No. 2.—To remove the spots it may be necessary to remove the lacquer with potash, boil out in water to which is added a little cream of tartar and then allow to cool and immerse very quickly in the bright acid dip, wash well by the aid of the hot water and cream of tartar, repolish and lacquer.

No. 3.—The mixture of the buckle is the regular yellow brass mixture 64 to 70 parts copper, 30 to 36 parts zinc, and 1 per cent. of tin should be added to produce a close grained metal.

No. 4.—By dipping in the usual acid dip, consisting first of immersing in 38 per cent. aqua fortis for a few seconds and rewashing and immersing in the potash, then dipping in the bright acid dip consisting of

Aqua fortis	½ gal.
Oil of vitriol	½ gal.
Water	1 qt.
Salt	½ oz.

Washed well and dried out. The plain parts polished by 100 emery upon leather covered wheels, then cut down with tripoli upon the buff wheel. Colored with a soft cloth wheel using brass rouge composition. Washed with benzine, gasoline or boiled out with platers compound to remove the buffing composition. Then lacquered with a gold tinted dip lacquer and dried by the aid of heat.—C. H. P.

TINNING

Q.—I am led to understand that there is a method of tinning steelwork by an electric process for tin and nickel. We are large manufacturers of deep steelwork and do a great deal of tinning by the old-fashioned method of melted metal, but we have reasons to believe that there is a more modern method by electric process which turns the work out very bright, even and without list marks.

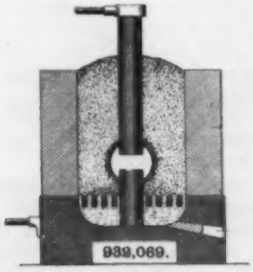
A.—We doubt whether you would be entirely satisfied with electro-deposited tin or tin alloyed with nickel for the class of work for which you desire a substitute for coating with molten metal. We understand that you wish to coat drawn sheet metal vessels especially deep. To electroplate hollowware requires considerable special arrangements and skill to uniformly distribute the coating. If you have any pieced ware to coat, the soldering action effected by the hot process cannot be practically accomplished by the electrolytic method. A more thorough description of just what you wish to coat will better enable us to advise you in this matter. We are at present investigating a method of tinning by coating with a tin or other powder or alloy of metal powders and driving off the binding liquid by heat.—W. L. C.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

932,069. Aug. 24, 1909. ELECTRIC FURNACE. Frank J. Tone, Niagara Falls, N. Y. In the reduction of many ores in an electric furnace if the products of reaction are allowed to accumulate in the vicinity of the arc, its intense heat will tend to volatilize them, causing a considerable loss of the metal or product.

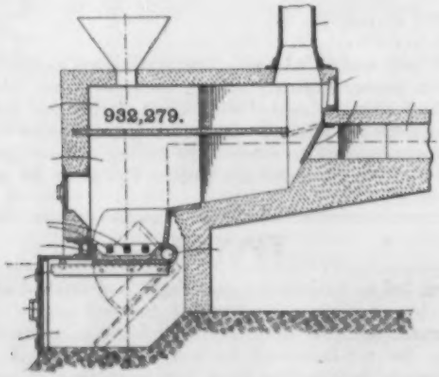
This invention provides an improved furnace, shown in cut,



which will more effectually support the charge and separate the products of reaction therefrom while taking the products out of the reduction zone or arc region.

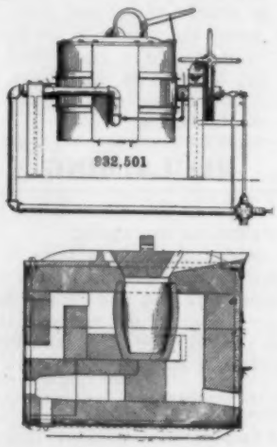
To that end the invention consists in an electric furnace having a supporting hearth which is pervious to the products of reaction, with a collecting space or receptacle beneath this hearth.

932,279. Aug. 24, 1909. FURNACE FOR VOLATILE METALS. Woldemar Hommel, London, England. Assignor to Metals Extraction Company, Ltd., London, England. This is a blowing furnace for volatilizing zinc and burning the same to form



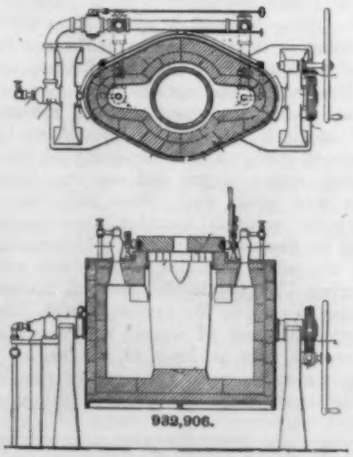
zinc-oxid. As shown in the cut the furnace has a blowing hearth, consisting of a rectangular trough rotable on a horizontal axis. There are two flues at the end of the furnace-chamber, one leading to the zinc-oxid condensing apparatus, and the other to the stack.

932,501 Aug. 31. 1909. CRUCIBLE FURNACE. Wm. Scrimgeour, Portsmouth, Va. The object of this invention is to provide an improved crucible furnace, shown in cut, particularly adapted for use with hydrocarbon or like fuels. The construction comprises a furnace casing mounted for oscillation, one or more crucibles supported in the furnace chamber within the casing, and a burner in operative relation with the casing and movable therewith. In the preferred construction a combustion chamber is provided in communication with the lower portion of the furnace chamber, and the waste products of combustion are discharged from the upper portion of the furnace chamber through a vent flue or flues so disposed that the products of combustion serve to heat the combustion chamber or to maintain its temperature. The trunnions are hollow and serve as conduits for the fuel and for the steam or air required for



its combustion, the construction being such that the burner may be mounted upon the casing and operated if desired in any position of the furnace.

932,906. Aug. 31, 1909. CRUCIBLE FURNACE. Walter S. Rockwell, New York. Assignor to W. S. Rockwell Company, N. Y. This patent covers an improvement on a furnace embodied in patent application number 443,432. In the furnace described in that application, the combustion chamber is on one side of the crucible chamber, the latter being in open communication with the combustion chamber. While this construction is admirably adapted for small crucibles for melting small quantities of brass or other metals, it has been found that when using

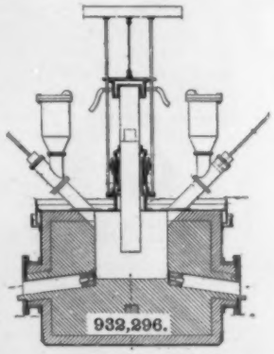


a large crucible, or when melting the more refractory metals such as nickel, steel etc., it is necessary to have a more intense heat than can be obtained by a single burner at one side, and as great an envelopment of the crucible by the flame as possible. This has been accomplished by providing the furnace, shown in cut, with two combustion chambers, located on opposite sides of, and in open communication with the crucible chamber.

933,139. Sept. 7, 1909. ANTIFRICTION ALLOY. Eurique A. Tonceda, Albany, N. Y.

The invention consists in incorporating in an alloy of lead and cadmium a proportion of magnesium, whereby both the lead and cadmium constituents are hardened and toughened. This inventor does not limit himself to any relative proportions, nor to the use of lead, cadmium and magnesium alone, but he considers as within the scope of his invention any antifriction bearing alloy containing both lead and cadmium wherein both of those metals are hardened by the presence of magnesium.

932,296. Aug. 24, 1909. ELECTRIC FURNACE. Gilbert C. Landis, York, Penn. Assignor to American Phosphorus Company, Camden, N. J. An electric furnace for melting metals so con-

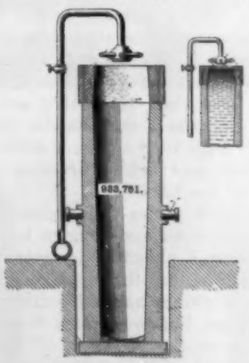


structed, see cut, as to prevent the rapid burning away of the lining. Means are provided for the even distribution of the material within the furnace, and to prevent arcing between the conducting lining and the bottom terminal. The tapping openings can be relined without dismantling the furnace.

933,612. Sept. 7, 1909. METALLIC PRODUCT. Geo. F. Allen, Toronto, Canada. Assignor to Edward R. Hoyt, St. Louis, Mo. The invention relates to a metallic product comprising an iron or steel body to which is applied a coating that serves to protect the body and also to provide a surface around the body and which will afford resistance to the action of acids to a much greater degree than the iron or steel body, which may be termed the "core" of the metallic product. The coating consists of an alloy of lead and zinc, a coating of zinc over the first mentioned coating and a final coating comprising an alloy of from ten to fifty per cent. of tin and the balance lead.

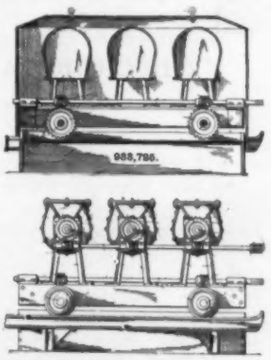
933,751. Sept. 14, 1909. METHOD FOR MAKING SOUND METAL INGOTS AND OTHER CASTINGS. Robert A. Hadfield, Sheffield, England.

By means of this invention, see cut, the metal in the upper portion of an ingot or other mold is kept in a liquid condition,



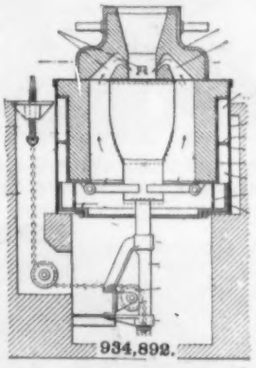
thus preventing the formation of pipes and blow holes due to shrinkage. This object is accomplished by means of a layer of solid fuel, as charcoal, which is burned on top the molten metal by a blast of compressed air. While this method was primarily intended for steel, it can be applied with equal success to other metals of a shrinkable nature.

933,725. Sept. 7, 1909. SHERARDIZING APPARATUS. Albert F. Shroeder, Cleveland, Ohio. By means of this device, shown in cut, the articles to be sherardized, after being freed from dirt, grease, etc., are placed in metal barrels with a quantity of zinc dust. The barrels or drums with their contents are then moved into a heating chamber preferably a furnace and heated to the desired temperature for the desired length of



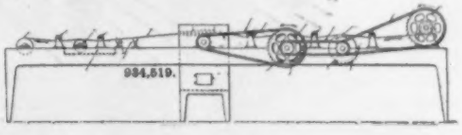
time after which they are withdrawn and allowed to cool. While in the furnace, the barrels or drums are revolved either continuously or periodically to thoroughly bring the zinc dust into contact with the material to be sherardized. When the barrels or drums are removed and opened, they are rotated to discharge the material, the zinc dust and coated articles being simultaneously discharged. The latter operation formerly resulted in quite a loss of the zinc dust but means are provided in this apparatus to confine the dust and separate the same from the coated articles without loss.

934,892. Sept. 21, 1909. SMELTING FURNACE. Christian and Josef Dibus of Höchst-on-the-Main, Germany. This furnace is provided with an arrangement whereby all the heat of the escaping gases is utilized for preliminary heating purposes.



This is accomplished by a cover arranged above the crucible, as shown in cut. The cover having a charge hole and adapted to serve as a preliminary heater.

934,519. Sept. 21, 1909 APPARATUS FOR COATING SHEET METAL. Barthold Goldsmith, Lisbon, Ohio. This is an apparatus, see cut, for coating roll, sheet and plate metal with a coating of metal or alloy, and more particularly for coating on one side only. The object of the invention is to provide for



this purpose an apparatus of simple construction, whereby roll, sheet or plate metal can be rapidly and thoroughly coated with a substantially uniform layer of the coating metal or alloy, and whereby the coating metal is prevented from getting onto the edges and the upper surface of the roll, sheet or plate metal and also prevented from being wasted.

INDUSTRIAL

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

THE CHOICE AND EQUIPMENT OF MOLDING MACHINES.

By Glen Muffly.*

We occasionally find a foundry where molding machines have fallen into disrepute and these can be mainly divided into two classes: (1) those who have tried the wrong machine for their work; (2) those who have used the right machine with poor equipment. Some make the mistake of trying to squeeze a 24 in. x 48 in. mold on a hand press and others having a small and simple pattern that would be ideal as a squeezer job think they must invest in a complicated machine that will keep two molders and a machinist busy.

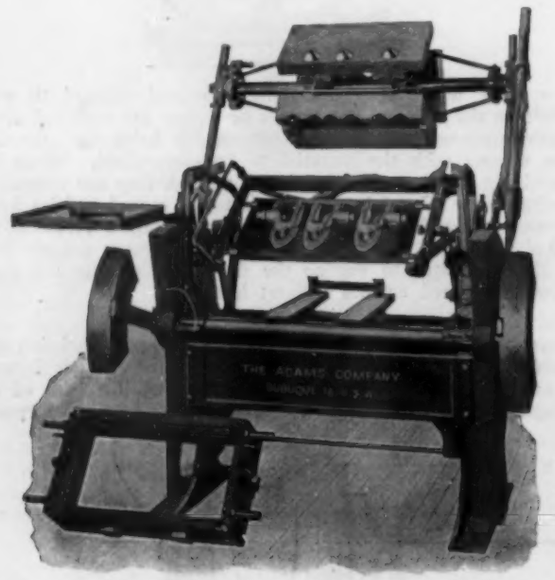


FIG. 1. MOLDING MACHINE ADAPTED FOR CONTINUOUS WORK, USING STANDARD PATTERNS THE YEAR ROUND.

FIG. 2. PLAIN SQUEEZER FOR MATCH PLATE PATTERNS, SQUEEZING COPE AND DRAG SIMULTANEOUSLY.

Either course is obviously wrong as hand squeezers are not recommended for molds with an area greater than 400 square inches but will enable an ordinary operator to put up all of the small molds he can pour off at the end of the day. In fitting up any type of molding machine it is necessary to have good patterns and use some judgment. This applies to the simple types as well as the more complicated machines and even a plain squeezer must have good snap flask, presser boards, etc.

The machine shown in Fig. 1 belongs to the more complicated class selling at from $200 up and although well adapted for certain kinds of work not desirable equipment unless the same pattern is used the year around. It is a pretty expensive proposition to set high-priced machines out in the yard when you wish to take a pattern out of the sand for a time. If stripping plates are required a machine similar to Fig. 3 will do the work and when the pattern is lifted off the machine can be used as a plain squeezer until it is again necessary to put on a stripping plate pattern. The plain squeezer as shown in Fig. 2 is adapted for match plate patterns pressing cope and drag at the same time and will also handle ordinary carded patterns, using an oil match and squeezing drag first, then cope. It is best to pien around the edge of the flask with the shovel handle before squeezing and when the pattern is high in the cope a little sand should be removed over the high spot before pressing, to prevent packing that part of the sand too hard.

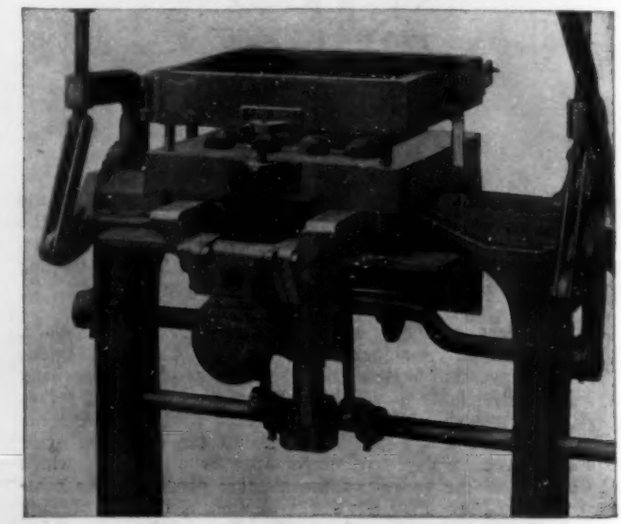


FIG. 3. MACHINE USED WITH STRIPPING PLATE, OR CAN BE USED AS A PLAIN SQUEEZER.

Cast aluminum match plates are recommended for squeezer use, as they allow both cope and drag to be pressed at once and are readily vibrated by a pneumatic rapper attached to the machine, where it is operated by the molder's knee, as he draws the pattern. Roll over machines and the jolting type operate nicely on many larger patterns, but as a rule it is the small castings that are made in quantity so the writer is of the opinion that more attention should be paid to the proper equipment of the simple squeezer.

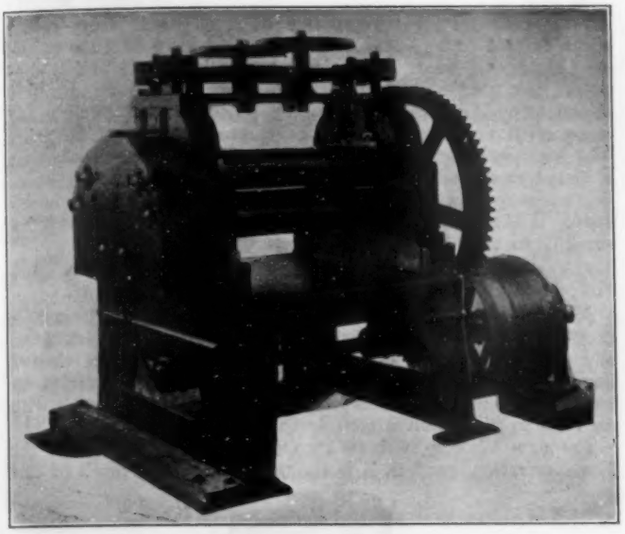
* With the Adams Company, Dubuque, Iowa.

A NEW 5-ROLL METAL STRAIGHTENER.

We show in cut a 5-roll straightener designed to straighten brass, bronze or copper bars from ¼ to 1¼ ins. thick. This machine is manufactured by The Atlas Machine Company, of Waterbury, Conn., builders of metal and wire working machin-

ery. The rolls are made any width of face from 24 ins. to 30 ins. There are separate adjusting hand wheels for each of the top rolls. Ratio of gearing is 5 to 1.

To increase the efficiency of this machine, the rolls, which are 6 ins. diameter, are spaced 6½ ins. center to center, making a very short bend and reverse in the bar to be straightened. The roll housings are of cast steel, fitted with bronze boxes for roll neck journals. The rolls are made of the best quality hammered



ATLAS 5-ROLL METAL STRAIGHTENER.

crucible machine steel. All the gearing is cut from solid stock. The pinions being made of steel and the elevating gearing and main driving gear of cast iron.

SPECIFICATIONS.

Diameter of roll necks, 4¼ ins.
Length of bearing, 6 ins.
Surface speed of rolls, 100 ft. per minute.
Tight and loose pulley drive, 24 ins. x 8 ins.—320 r.p.m.
Weight, 5,500 lbs.

DOUBLE SPINDLE POLISHING LATHE.

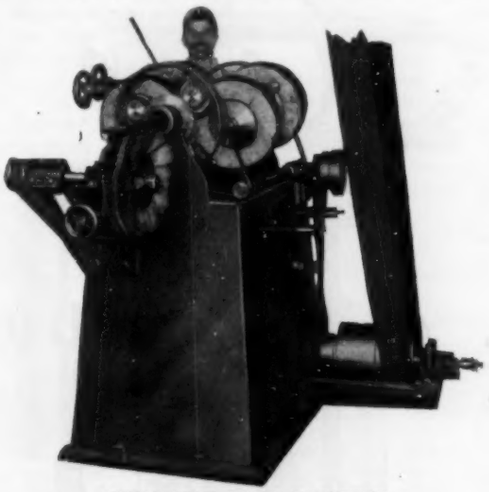
An exceptionally well-designed double Spindle Polishing or Buffing Lathe is shown in the accompanying cut with features of construction which strongly commend it. The two independent spindles and design of the front legs permit two men to work comfortably on the same machine independently of each other.

NEW OSBORN POLISHING LATHE.

This feature not only saves much time when operators are changing wheels, but will also be found a great saving on driving belts, amounting from 75% to 100%. The long, heavy bearings with 1½-inch spindle and all-around substantial construction make it especially well adapted for polishing and buffing large work, as in stove factories, etc. This machine is made by The Osborn Mfg. Co., Cleveland, Ohio, who have added it to their already large line of foundry and shop equipment.

A TUBE POLISHING MACHINE RECORD.

The Tube Bending Machine Company, Glen Ridge, N. J., has put on the market a new machine for automatically polishing tubing of any length and of any diameter up to three inches. The machine is simple in construction and easy and economical to operate. One machine of this type which has been in use for some time in a prominent factory polished 6,000 feet of brass-covered iron pipe per day of 10 hours, running six consecutive

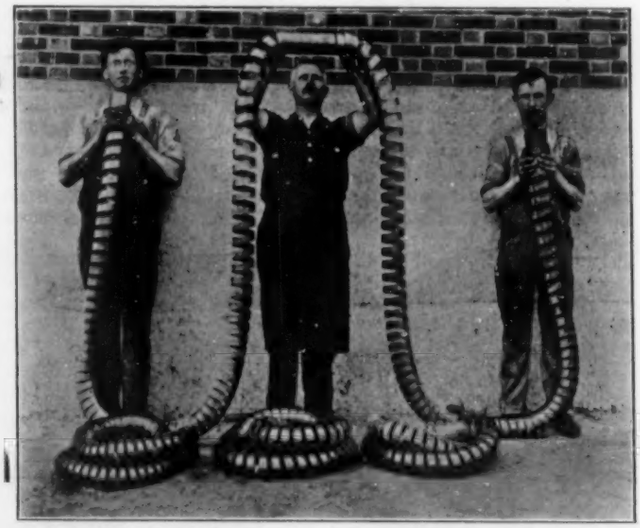


AUTOMATIC TUBE POLISHER.

days at this rate and using only one set of buffing wheels and six bars of composition per day, a remarkable record when compared with other methods of polishing. The machine weighs 1,500 pounds, is strong and compact, occupies but little floor space, and on account of the automatic feed requires only one unskilled man to attend it. Any sort of rag wheel can be used or emery wheels can be utilized for cutting down steel tubes.

BRASS HELICES.

The large brass helices shown in cut were made by cutting a 1½-inch pitch thread ¼-inch wide on hard-drawn seamless brass tubes 3¾ inches in diameter and 3-64-inch thick. These helices



SOME REMARKABLE BRASS HELICES.

were made for the United States Government by The Screw Cutting Company of America, Philadelphia, Pa., who can cut these from hard-drawn brass tubing of any description.

THE RECORD AIR BRUSH.

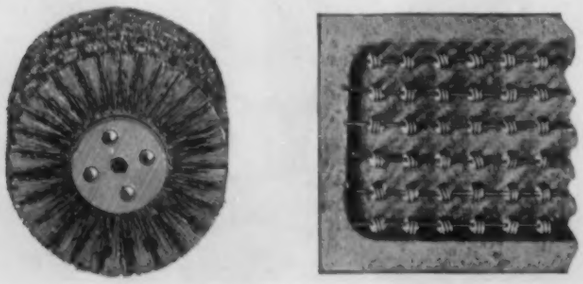
The Eureka Pneumatic Spray Company, 400 Canal street, New York, who were the pioneers in introducing the spraying method of lacquering, enameling, bronzing, etc., and who have probably done more to perfect the process than anyone else, have recently put on the market a new model of their sprayer called the "Record." As shown in the cut it is made with a glass container and has all the patented features which have made the "Eureka" sprayers so successful. The "Record" is made in

THE "RECORD" SPRAYER.

three sizes and can be used without an air compressor, thus making it available for the small manufacturer who heretofore has been obliged to stick to the old expensive hand process. When used without a compressor the sprayer and all necessary accessories can be installed at a cost of less than $25.00.

"MINERVA" WIRE BRUSHES.

The method of fastening the wires in these brushes is radically different from that employed in other brushes, and is intended to prevent the wires from becoming brittle from vibration and snapping off close to the shoulder. This purpose is accomplished by drawing the wires through large holes in the metal seat and bending them around the steel rods placed transversely in the cavity at the back of the brush. The wires, consequently, are movable in every direction and conform to the shape of the sur-



METHOD OF FASTENING WIRES.

face being cleaned and wear down evenly to the metal seat. "Minerva" brushes are patented and are manufactured by the American Wire Brush Company, New York.

"HASCO" CLEANING COMPOUNDS.

Haas Bros.' Co., Newark, N. J., are offering to platers two products that are entirely new and different from anything heretofore put on the market. They have been thoroughly tried and their value established.

"Hasco Lime-off," a lime remover, works on a new principle. It dissolves the lime quickly and thoroughly, but does not tarnish the work as do so many other removers. Its price is very low.

"Hascoleanser", for removing oil and grease from metal parts, is said to be superior to whale oil soap because it has no objectional odor, it does not harm the hands and it dissolves the grease in such a manner that the parts are left chemically clean, thus preventing stripping and peeling, as is so often the case when the parts are not cleaned properly. The chemical constituents of "Hascoleanser" are such that it dissolves the oil and grease without depending on the caustic, consequently it is a more neutral soap than whale oil soap. Those interested may obtain further information by sending to the above firm for their pamphlet "HB."

NEW HYDRAULIC JACK.

Anyone who has much heavy lifting to do appreciates that there are pleasanter tasks than carrying around a jack from one place to another, especially when it weighs more than a hundred pounds. It means rather a heavy load if carried by hand, and if the jack is loaded and reloaded onto a truck with each using, this involves considerable work too.

The new Watson-Stillman shop jack, which we show in the first illustration, renders, it is claimed, unnecessary much of this

WATSON-STILLMAN PORTABLE JACK.

labor. This jack, made in eleven sizes, of from 20 to 50 tons capacity, and lifts of 12 and 18 inches, fills all the ordinary requirements of lifting heavy machinery and for general shop work. The wheels on the base and the handle on the cylinder facilitate moving the jack quickly from one place to another without the exertion of a great deal of energy. The wheels touch the floor only when the jack is tilted, so they are never in the way during the lifting operation. If it is desired to use the jack at an angle, it can be tilted in the opposite direction to the wheels, and when it is laid flat upon the side, the ram will push out its entire lifting length. The head is enlarged sufficiently that the jack will not stop working for lack of filling, even if there has been slight leakage.

An independent steel claw (not shown in the illustration) can be used when desired for lifting from near the ground. This is more convenient than a permanently attached claw, as the independent part is easily applied when a low lift is required, and its removal at other times allows the jack to be made of considerably lighter weight. The weight, however, is comparatively small because the whole jack is made from steel, and the parts under greatest strain, such as the ram and cylinder, are machined from a solid bar of higher carbon steel than usually found in hydraulic or other jacks. This jack, though plain in construction, has proven very reliable in service, and on account of its special design, greatly facilitates the handling of heavy equipment.

Associations and Societies

REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

AMERICAN BRASS FOUNDERS' ASSOCIATION.

President, Wm. R. Webster, Bridgeport, Conn.; Secretary and Treasurer, W. M. Corse, Detroit, Mich. All correspondence should be addressed to the Secretary, at the address given below. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association in a succession of cities, as invited. The next convention will be held in Detroit, Mich., June, 1910.

Secretary W. M. Corse has changed his address from 123 Palmer avenue, East Detroit, Mich., to care of the Lumen Bearing Company, Buffalo, N. Y. He reports that a number of prominent chemists and metallurgists connected with various metallurgical establishments, have submitted copies of their methods for the aid of the committee on standardization of methods for the analysis of copper and brass alloys. This committee it will be remembered was appointed at the Cincinnati convention of the American Brass Founders' Association, held in May, 1909.

The following have been added to the list of members: The Crescent Brass & Pin Co., 1150 Trumbull avenue, Detroit, Mich.; J. A. Hardy Sons Co., Fitchburg, Mass., and J. M. Wilson, Chemist in charge, Bureau of Steam Engineering, U. S. Navy, Allentown, Pa.

NATIONAL ELECTROPLATERS' ASSOCIATION OF THE UNITED STATES AND CANADA.

President, Chas. H. Proctor, Arlington, N. J.; Treasurer, Nathan E. Emery, New York, N. Y.; Secretary, Benj. W. Gilchrist, Woodhaven, N. Y. All correspondence should be addressed to the Secretary, Benj. W. Gilchrist, Box 26, Woodhaven, N. Y. The objects of the association are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. Meets the first Saturday of each month, 8 p. m., at the Hotel Chelsea, 222 West Twenty-third street, New York City.

The eighth regular meeting was held Saturday, Oct. 2, 1909, at the Hotel Chelsea, 222 West 23d street, New York City. Twenty members were present and a spirited meeting resulted. The banquet committee reported progress and were instructed to proceed with arrangements for a banquet at which some men prominent in electroplating will be invited to speak. Three applications for active membership were received and turned over to the advisory board for investigation. Jos. A. Straub, of New York City, was elected an active member.

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS.

President, Joseph H. Glauber, Cleveland, Ohio; Commissioner, William M. Webster, Chicago, Ill. All correspondence should be addressed to the Commissioner, William M. Webster, 1110 Schiller Theatre Building, Chicago, Ill. The objects of the Association are to promote in all lawful ways the interests of firms engaged in the manufacture of brass goods. Meets every three months. Each meeting fixes the place and date of the meeting to follow, consequently there is no stated place. It has been customary for the Association to hold its Annual Meeting in New York City, but the last meeting was held in Philadelphia. The Semi-Annual Meeting is generally held at Atlantic City or some other seacoast town.

The next meeting will be held in New York City on December 7 and 8, 1909.

INSTITUTE OF METALS.

President, Sir Gerard Muntz, Bart.; Treasurer, Professor Turner; Secretary, G. Shaw Scott. All correspondence should be addressed to the Secretary, G. Shaw Scott, M. Sc., Institute of Metals, Caxton House, London, England. The objects of the Institute are for the educational welfare of the metal industry.

The Manchester meeting of the Institute was held Oct. 14 and 15, 1909, at the Hall of the Municipal School of Technology, Sacksville street, Manchester, England. The following papers were submitted at the meeting:

(1) J. H. Andrews, Esq., M. Sc., and C. A. Edwards, Esq., on "The Constitution and Properties of the Ternary Alloys Alluminium-Copper-Tin."

(2) C. O. Bannister, Esq., Associate R. S. M., and H. J. Tabor, on "The Surface Appearance of Solders.'"

(3) H. W. Greenwood, Esq., on "The Technical Assay of Zinc."

(4) J. S. Glen Primrose, Esq., on "Notes on the Production of Pure Spelter."

(5) E. L. Rhead, Esq., on "Some Causes of the Corrosion of Copper and Brass."

(6) Professor C. A. Smith, M. Sc., on "The Elastic Breakdown of Non-Ferrous Metal."

(7) Professor T. Turner, M. Sc., and M. T. Murray, Esq., M. Sc., on "The Copper-Zinc Alloys—A Study of Volume Changes During Solidification."

During the progress of the meeting members visited the following works by invitation of the owners:

Baxendale & Co., Lead Mills, Trafford Park.
The British Westinghouse Electric Co., Trafford Park.
Richard Johnson & Nephew, Ltd., Salford.
Smith Bros., Goldbeaters, Bridge street.
Isaac Storey & Co., Ltd., Cornbrook.

Further particulars of this meeting received too late for this month will be given in the November issue of THE METAL INDUSTRY.

INSTITUTE OF METALS.

ABSTRACTS FROM DISCUSSION OF PAPERS READ AT INSTITUTE OF METALS.*

At the last meeting there was very good attendance, and three papers were read. In one of these Mr. F. Lane pointed out the brief causes of failure in furnace arches, among which were mentioned neglect to insure the perfect normality of every springer to the curve of the arch. The most important paper, however, was that by T. J. Mountford, a former student in the Metallurgical department of the Municipal Technical School, and now engaged in jewelry manufacture. His subject was, "Metallurgy in the Jewelry Trade." On this a discussion arose as to the use of copper in gold alloys and coloring solutions. Mr. Mountford stated that the only copper yielding uniform results was Swedish, supplied as wire. He attributed this partly to the greater cleanliness with which wire can be kept in store, but more especially to the fact that the metal had been worked. He, however, only threw out the latter suggestion as a possible explanation. Mr. Johnson, who is an expert with regard to copper, said that he had been struck by the superiority of Swedish copper for such purposes, and had tested the theory with regard to working by having other coppers drawn into wire. The results did not favor the theory, and at present no satisfactory explanation could be found.

Other members suggested that when the copper was melted the previous working could not affect its properties. Mr. Mountford and others mentioned that even with electrolytic copper they failed to get such good results as with Swedish copper, though in some cases the purity was as high as 99.9. Mr. Mountford thought possibly certain oxidization effects from the working might remain even after the copper was melted.

*London meeting.

ITEMS OF INTEREST TO THE INDIVIDUAL.

Sir William White, first president of the Institute of Metals, was a visitor in New York during the Hudson-Fulton celebration. He returned to England, Oct. 6, on the Mauretania.

William Schneider, formerly foreman plater for North & Judd Manufacturing Company, New Britain, Conn., has severed his connection with that company.

H. W. Cumming, of Newark, N. J., has become foreman in charge of the polishing, plating, coloring and finishing departments for the H. C. Bliss Manufacturing Company, Attleboro, Mass.

Mr. Charles W. Hofsees has resigned his position at the factory of the Bristol Brass Company, Bristol, Conn., where he has had charge of the tube department for the past nine years. Mr. Hofsees has not yet completed his plans for the future.

T. P. Gourley, who was formerly connected with the Hawley Down Draft Furnace Company, of New York, covering the Western territory, has accepted a similar position with J. B. Wise, Watertown, N. Y., and will cover practically the same territory in the interests of the M. R. V. Furnace.

Harry A. Oswald has become manager of the plating and polishing supply department of the Detroit Foundry Supply Company, Detroit, Mich. Mr. Oswald has had a long experience in the plating business and is entirely familiar with the particulars. He no doubt will prove a valuable acquisition to the firm that he has just become connected with.

Mr. Chas. M. Hall, Vice-president of the Aluminum Company of America, who recently underwent a severe operation has greatly improved and is now at his home in Niagara Falls. Mr. Hall will shortly go to Atlantic City, where he will spend a month or two before returning to take up the cares of active business.

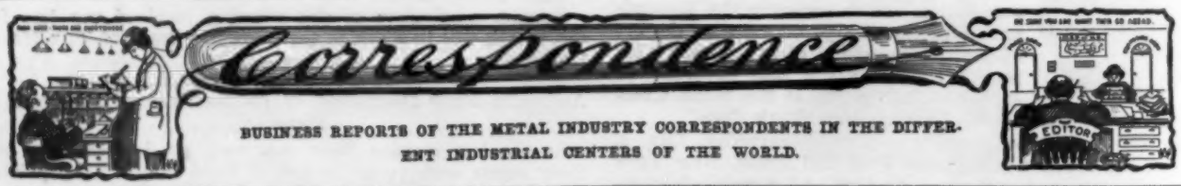
F. H. Banbury, engineer for the Acheson Oildag Company, Niagara Falls, sailed for Europe on the St. Louis, Saturday, September 25. Mr. Banbury is a mining, mechanical and electrical engineer and has been connected with the Oildag Company for the past year. He goes to Europe for the purpose of establishing the Oildag process abroad, and also to look after the extended interests of the company.

William M. Corse, secretary of the American Brass Founders' Association, and well known in brass foundry circles, has resigned his position as assistant manager of the Michigan Smelting and Refining Company, of Detroit, Mich., and has become works manager for the Lumen Bearing Company, of Buffalo, N. Y. The Lumen Company are large manufacturers of brass, bronze and aluminum castings, special attention being paid to the quality of their work. The company has a number of capable brass men on its staff. The association address of Secretary Corse will be for the present, care of the Lumen Bearing Company, Buffalo, N. Y.

DEATHS

Edward T. Coe died at his home in New Haven, Conn., Oct. 5. Mr. Coe was identified with the Coe Brass Company of Torrington, Conn., as treasurer for a great many years.

Charles X. Cordier, for a number of years the eastern sales agent of the Ross-Tacony Crucible Company, of Tacony, Pa., died August 31, 1909, at New York.



BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

OCTOBER 7, 1909.

Manufacturing business is now booming hereabouts, and in all the large plants there are many men at work overtime from two to five nights each week. Since 1907 there has been no busier time here and the present outlook is that the rush will continue almost to the holidays.

Last Monday the municipal election was held, but it was the end of one of the tamest campaigns ever known in Waterbury, largely because the factories were kept busy nights. William B. Hotchkiss, Republican, head of the Hotchkiss & Templeton Co., Inc., hardware dealers, was elected over the Democratic candidate, Francis T. Reeves, to the great surprise of politicians. Mr. Hotchkiss is a new comer in politics, but is well known to all the metal trades throughout this section of the State, and is popular as a business man. He was given considerable assistance by factory men, and polled a large portion of Democratic votes. C. P. Goss, of the Scovill Manufacturing Company, was one of his best workers.

With orders pouring in and many to be filled in short time, the shops are being put to their fastest strides to keep up to the market. Even foreign business is showing a general improvement, and before many more months elapse should be back at its old prosperity mark.

Freight has been so heavy here that some new records have been registered during the past months in the railroad yards, and it is beginning to look as if the new and commodious track facilities accompanying the new station would be found hardly adequate five years from now with normal activity in the shops. During one week in September there were nearly 2,000 cars of freight shipped from here, and the average for the month was not far from 1,600 cars, weekly, each way. The American Brass Company is the largest consumer and the heaviest shipper, but the Chase Rolling Mill Company handles almost as many cars. The tonnage of the latter corporation's shipments is not as large as the Brass Company's.

Some of the largest plants running overtime are mentioned below. In the Benedict & Burnham plant of the American Brass Company there is a large force employed all night in the copper department and four or five nights weekly during the past months, the full complement of help in the tube and rolling mills of the same shop has been kept busy until 9 p. m. At least two-thirds of the entire force of the Chase Rolling Mill Company is working till 9 p. m. nightly in all but a few of the smaller departments, and five nights a week, the employes of the tube mill of the Scovill Manufacturing Company are employed until 9 o'clock. The Matthews & Williard tool department, an adjunct of the Scovill plant, is working full force four nights a week. Casters are kept on all night, two shifts of help being necessary to handle the work in the Randolph & Clowes

Company's plant. All the watch departments of the Waterbury Clock Company are running overtime, eight to twelve hours a week, and at the plant of the New England Watch Company the various departments are employed eight hours overtime each week. This concern's new movement, which was first put on the market early last spring, seems to be winning favor and goodly sales are reported. Overtime has been necessary nearly two months in the nickel and buffing departments of the Waterbury Manufacturing Company, and two nights a week the Waterbury Farrel Foundry & Machine Company runs overtime.

Both the Oakville Company in Oakville and the American Pin Company in Waterville, which ran overtime even in panic season, are still put to their best speed daily and overtime three to five nights a week. So busy have these factories been and so large are their respective forces, that there is a continual realty boom in the suburbs in which they are located, and the city is fast extending westward in their direction.

With the advent of November there will probably be a slight decrease in this speed, but the prospects are considered good for continued prosperity.

Copper shipments into the city have fallen off slightly during the past three weeks and are not expected to increase rapidly between now and the first of the year. Other raw products are being shipped in continuously, and as stock falls the manufacturers will be replenishing their copper and other metal supplies, though there seems to be little tendency to buy in large quantities, even at favorable prices. Collections are fair. There has been only a slightly noticeable tightening of money here.—F. B. F.

PROVIDENCE, R. I.

OCTOBER 4, 1909.

Statistics recently compiled by the State of Massachusetts show that North Attleboro had 40 jewelry establishments. Out of $2,685,639 invested in manufacturing in the community, $1,711,993 is invested in jewelry. The value of stock and materials used in this industry is $1,313,513 and in other industries $664,642. The total amount of wages paid during 1908 was $1,642,241 and of this $1,289,594 was paid by jewelers. The average amount of wages paid during the panic year was $618.31. The average in the jewelry shops was $626.02 and in other enterprises $591.69. In the town there were employed 1,838 males, 818 females, making a total of 2,656. Of this number 1,430 males and 630 females worked in the jewelry shops. The smallest number at work during the year was 2,087 and the largest 3,292. The minimum number ever working in the jewelry shops was 1,626 and the greatest 2,500. The total value of the products turned out was $5,617,544, and of this amount $3,987,456 is assigned to the jewelry industry.

Plainville has six establishments; amount of capital devoted toward production, $199,856; value of stock and materials used, $71,321; amount paid out in wages, $195,356; average yearly earnings, $731.67; male wage earners employed, 201; women, 66; smallest number of employed at any time, 185; greatest number, 322; value of product, $565,733.

Attleboro has 53 jewelry establishments with $3,202,252 devoted to the production of jewelry. During the year $3,232,294 worth of stock and material was used and $1,930,835 expended in wages. The average yearly earnings in jewelry was $613.74 and for all industries $577.62. The number of males employed was 2,013, females 1,133, a totla of 3,146. The smallest number employed at any one time last year was 2,461 and the greatest number 3,940. The value of the jewelry products was $72,144.66.

Articles of incorporation of "The Frank E. Guild Company" have been filed at the office of the Secretary of State by Frank E. Guild, Allin W. Ripley and Edward J. Brownell. The concern is capitalized at $50,000. It will engage in the manufacturing jewelry business.

George C. Richter, Victor F. Richter and Thomas A. Carroll, all of Providence, have filed with the Secretary of State the articles of incorporation of "The Richter Manufacturing Company." The company, which is capitalized at $40,000, will engage in the manufacture of jewelry and silverware in Providence.

The manufacturing jewelry business in this city is booming in all lines at the present time. The prosperity is not confined entirely to Providence but takes in the numerous concerns located at Pawtucket, Woonsocket, the Attleboros and other communities in this district. Hardly a manufacturer can be found who has not felt in substantial proportions the effects of the increased business. Numerous establishments are running day and night and others are planning to go on double time soon in order to fill the orders which are piling up. Everything indicates that the present season will be one of the best in the history of jewelry manufacture in this section. The demand for help is great and the evening newspapers want columns are filled each evening with advertisements for skilled help.

The patent infringement case of the George L. Vose Manufacturing Company and the Corey Manufacturing Company vs. G. C. Hudson & Co., which is now pending in the United States Court in Providence is attracting considerable attention. The hearings are held before Judge Arthur L. Brown. There is a large array of eminent legal talent on both sides. The complainants claim that their rights in inventions patented by Thomas C. Hudson of a certain style of bracelet have been infringed and ask for an injunction on manufacture. The defence denies the originality of the Hudson patent and asserts that the patent has been abandoned to the public.

Among the prominent manufacturing jewelers of the city who are candidates for re-election at the coming elections are Mayor Henry Fletcher and Representatives George H. Holmes and Harry Cutler. The latter is President of the New England Manufacturing Jewelers' and Silversmiths' Association.

The Globe Jewelry Company has established a plant on Railroad avenue, Attleboro. The concern will manufacture ladies' goods and rolled plate novelties. The factory, which has the backing of Providence capital, will be in charge of Otto Newhouse as superintendent.

The Finberg Jewelry Company recently entertained its 100 employees at a reception in commemoration of the opening of its new addition. A delightful programme made the evening one long to be remembered. Mr. Finberg and Superintendent Lawrence McNary were in charge of the arrangements.

The Gorham Manufacturing Company has the contract to cast a large statue of Abraham Lincoln which is to occupy a prominent place in a public park in Orange, N. J. The statue was designed by Frank Edwin Elwell of Weehawken, N. J. It depicts Lincoln in the act of addressing a crowd. Across his back is draped a United States flag.

Rothchild & Levy, manufacturing jewelers, who now occupy quarters in the Bates & Bacon building in Attleboro are planning to move to the Doran building on Chestnut street, Providence.

Albert Pollard, formerly a member of the manufacturing jewelry firm of Albert Pollard & Co., of South Attleboro, died a few days ago after a long illness. He was born in Pennsylvania in 1874. After spending a few years in a department store he formed a partnership with his brother and engaged in the manufacture of miniature brooches. A few years ago he sold out to his brother, on account of ill health. The firm name is now Pollard & Darling.

The construction of the new addition to the Doran building in this city has made possible the extension of the plant of Vennerbeck & Clase through the entire new floor of the addition.

The manufacturing jewelers of the city are planning to do their share toward entertaining the Japanese commercial commissioners who are to visit this city the last of October. The jewelers are especially anxious that their interests shall be properly placed before the visitors. On the entertainment committee are the following jewelers: Harry Cutler, J. F. P. Lawton and Jacob B. Barton.

The Philadelphia Jewelry Mfg. Co. has purchased the plant of Jacob Bennett & Son in this city. The members of the new concern are Ira D. Garman and C. H. Docker.

James F. Phetteplace, assignee of L. P. Sturtevant, a jeweler of North Swansea, Mass., announces the assets of the concern as $15,023.90 and the liabilities as $45,648.34. After laying the matter before the creditors, the assignee was authorized to sell the plant.—E. S. U.

BUFFALO, N. Y.

October 4, 1909.

The second annual Buffalo Industrial Exposition which opens in the 65th Arsenal under the auspices of the Manufacturers' Club the first week in October promises to be the greatest show of local-made products ever seen in this city. It will be twice the size of last year's fair.

Among the manufacturers in our lines who have exhibits are the Aluminum Castings Company Barcalo Manufacturing Company, Buffalo Copper & Brass Rolling Mill, Foster & Glidden Engineering Company, The Heintz Art Metal Shop, Republic Metal Ware Company, U. S. Hame Company and the L. & I. J. White Company.

The metal trades business was good here last month. Brass foundries are operating with normal forces and are receiving good-sized advance orders for special work which presages activity right into the winter season. Several foundries are making small improvements to their plants and on the whole there is a feeling that better times in the trade are here to stay.

Plumbers' supply houses noticed an improvement the last six weeks owing to the renewed activity in the building industry. There are more large buildings going up than at any time in the last two years.

Two of the largest automobile factories located here report business on a healthy basis. Shipments to far sections of the country are big.

A company has been organized here to manufacture hardened copper, one of the lost arts, by the use of a process discovered by S. R. Dawson and to be known as the Dawson Hardened Copper Company. It is claimed by the use of this system that hardened copper may be made in a single operation.

The officers are: President, L. J. Chase; treasurer, Gus T. Fox; secretary, J. E. Young; directors, W. M. Ramsdell and Frank A. Abbott, of this city. Offices have been opened in Buffalo and a plant will probably be located in Erie, Pa.

The Lake Erie Engineering Works and the Lake Erie Boiler Works of this place have taken contracts to turn out for the Geat Lakes Engineering Works of Detroit seven and six sets of boilers, respectively.

Wire thieves are again giving the telephone and telegraph companies considerable trouble in this vicinity.—F. M. A.

CLEVELAND, OHIO.

October 4, 1909.

Business with the local brass and foundry companies is excellent as evidenced by the many additions which are being made to Cleveland plants. The automobile business is booming and difficulty is found in meeting the demand. All the brass departments in the auto plants are being worked to capacity and the plating departments are being kept busy finishing up the goods for final use.

Other lines of trade are also good. The various jewelry and watch manufacturers of the city are busy turning out goods for the Christmas trade. They are assured of a heavy line of orders for the holiday demand this year. Out of town orders are coming in faster than they can be filled on many lines.

Building operations being brisk, the call for brass and copper plumbing goods is heavy. There are a number of concerns in Cleveland heavily engaged in this industry. A permit for a $50,000 factory building for the Bishop & Babcock Company, which handles plumbing goods, has been let to be built on East 55th street. The building will be rushed to completion by early spring.

The City Brass Company is building an addition to its plant on St. Clair avenue near East 53rd street. Contracts for the building have been let and work is well under way. The Best Foundry Company has awarded a contract for a new factory building 180 x 200 ft. in size at Bedford, near Cleveland. Work has been started on this structure.

The Buckeye Brass foundry has been sold to the owners of the United States Pattern Company and henceforth the two concerns will operate under the name of the Buckeye Brass Foundry & Pattern Company.

Edmund E. Allyne, head of the Allyne Brass Company, has just finished a handsome new home on Shaker heights, the most exclusive section of the city. The structure is of shale brick in semi-colonial style and has a frontage of 1,000 feet on a boulevard.

A pretty row is raging in the county building commission over the furnishing of the new $4,000,000 county courthouse with metal furniture. The Van Dorn Company, of Cleveland, bid $101,000 on the job. The Art Metal Company, of Jamestown, N. Y., bid $117,000 and was awarded the contract because of superior samples. It developed, however, that two members of the board which awarded the contract left the commission and two new members entered before the contract was actually signed. The new members refuse to sign the contract and there the matter rests. The Art Metal Company threatens to sue to compel the commissioners to recognize their verbal contract.

The Webb C. Ball Watch Company is preparing to move shortly to new quarters on Euclid avenue near East 9th street, where a four-story addition to a building on the avenue is being erected to serve as a factory for the watch department. The firm's large retail store is also to be moved to the same locality. —S. L. M.

DETROIT, MICH.

October 11, 1909.

The metal industry in Detroit at the opening of the Fall months is facing unusually bright prospects. The automobile business, which is responsible for a great boom in the brass and polishing industry, is beginning with great energy and every brass factory in the city that is manufacturing parts for the 16 local automobile institutions is rushed with orders and will be kept on the jump throughout the Fall and the coming Winter. Four or five of the great automobile factories have almost doubled their capacity during the past Summer and are now in shape to produce an enormous number of machines every week from now until next spring. These vehicles all call for a great amount of brass trimmings which are manufactured in Detroit. Many of the brass manufacturing concerns that were mere corner shops a few years ago are now thriving establishments that are working a large force of men and occupy modern factories.

The Aluminum Castings Company is busily engaged on preparations for its new factory on Chene street which will cover 23 acres of ground. Charles Bohn, vice-president and general manager of this big corporation, declares he will surely be employing 1,000 men on aluminum castings alone by the first of next February if conditions favor in the erection of the new factory. This plant is engaged heavily in the manufacture of automobile parts which are nearly all used in Detroit.

Secretary Whirl, of the Employers' Association, is enthusiastic over the brass and aluminum industry. He forsees a great volume of business to be turned out from the Detroit brass establishments during the coming winter.

Among the firms that report a good business and have great prospects for the future are the American Injector Company, 173 Fourteenth avenue; American Lubricator Company, 93 Catherine street; Art Brass and Wire Works, Forest and Ellery avenues; Galvin Brass Company, 74 East Fort street; Pemberthy Injector Company, 346 Holden avenue; Superior Brass Company, 189 Larned street.

The manufacturing jewelers in Detroit are feeling a decided improvement in trade. Salesmen have already begun to report winter orders and plans are being made for the holiday trade which this year will be much larger than last. Traub Brothers and Wright Kay Company are both busy on Fall and Winter work and report prospects good for a large trade.—F. J. H.

BIRMINGHAM.

Rather more activity is reported in the brass trade, and this is emphasized in the reduction of the number of men out of work, as shown by the trade union returns. On the whole, the returns pan out badly, compared with those of the jewelry trade.

The prominence given to daylight saving schemes led the jeweler firms some time ago to consider the question of commencing operations in the morning an hour earlier and ceasing an hour earlier in the evening. The Jewelers' Association issued a circular suggesting the change, and as a result 160 firms have adopted the scheme. It is said to be working very successfully, and everybody appreciated the additional hour's holiday during the summer evenings.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

J. W. Roe, of San Gabriel, Cal., is just starting a general electroplating business. He will be glad to receive catalogues, etc.

The John Seaton Foundry & Manufacturing Company, Atchison, Kan., reports business as very satisfactory, all their men being kept busy and some working overtime.

Maxwell-Briscoe, Tarrytown, New York, the automobile manufacturers, are pushing their new brass foundry to completion. They expect to produce castings there very shortly.

The International Sales Co., 515 Equitable Building, Baltimore, Md., has taken over the business of the Busey Burner Company of that city, manufacturers of gas heating appliances.

The Phenix Tube Company, manufacturers of brass and bronze covered steel tubing, Brooklyn, N. Y., are erecting a large addition to their factory which will be used for storage purposes.

The Levett Manufacturing Company, manufacturers of supplies and equipment for electroplaters and polishers, whose factory is located at Matawan, N. J., have opened a New York office at 407 Canal street.

The Brighton Brass and Bronze Company, of New Brighton, Pa., is erecting an addition to the factory on Fifteenth street. The plant is busier now than at any other time. Many large orders are on the books.

The Onondaga Brass Company, 636 Canal street, Syracuse, N. Y., manufacturers of brass, bronze, aluminum and silver metal castings, advise us that they make a specialty of German silver castings from the softest to any degree of hardness the work may require.

The Syracuse Aluminum and Bronze Company, Syracuse, N. Y., is erecting a fireproof building containing 60,000 square feet of floor space. The new building will be devoted to the production of aluminum, aluminum-bronze and brass castings, and will be thoroughly modern in every respect.

C. G. Hussey and Company, Pittsburgh, Pa., are making a specialty of crimped copper sheets, their facilities enabling them to make shipments the same day orders are received. The crimps improve the appearance of the sheets and increase its strength without interfering with bending or forming.

The Tottenville Copper Company, of Tottenville, N. Y., has put up two new buildings and are now working on a third. One of the new structures which is already completed is used for a warehouse. The company are not ready to announce what uses they will make of the other two buildings.

The American Tube Works, of Boston, Mass., are running overtime several nights in the week. They have been very busy despite the fact that they have increased 100 per cent. during the past three years the capacity of their plant. They have started recently one of their new tube works.

The Dundee Brass Manufacturing Company, Elmira, N. Y., has started operations on the factory which has been rebuilt after the fire of last May. The new building has been made entirely fireproof by reinforced concrete construction. Electric lights will be burned at night and a hydrant has been put in the plant with power from the factory pump.

The Oblosser Manufacturing Company, of Bloomsburg, Pa., has recently added a nickel plating department to their rapidly growing business. The Oblosser Company manufacture the well-known Oblosser Never-Slip wrench as well as other novelties including linemen's pliers. They intend to add a number of machine tools to their present equipment.

The Bristol Company, of Waterbury, Conn., manufacturers of the Bristol Recording Instruments, has just established a branch office at Pittsburgh, Pa. This is located in the Frick Building Annex and one of their experts will be located there to co-operate with customers whose plants are in that vicinity.

The report in the current press that the brass foundry of the Baldwin Locomotive Works, Philadelphia, Pa., will be removed to Eddystone, Pa., is stated to be a gross exaggeration by Alba B. Johnson, vice-president of the company. He says that a report may have originated from some trivial repairs or alterations now going on at the present foundry at Eddystone.

The Gem Brass & Manufacturing Co., of Des Moines, Iowa, opened September 17, at 119-121 Walnut street (the location of the defunct Criterion Motor Car Co.) and will do a general brass casting and machine business. As soon as more machinery can be installed, the present working force will be largely increased. The outlook of business is very good and the plant is working 16 hours per day.

The Cassady Fairbank Manufacturing Company, of Chicago, Ill., is just breaking ground for quite an addition to their present plant, which will consist of 200 feet by 58 feet on La Salle street, and 164 feet by 50 feet at the end of the plant on La Salle street, running through to the alley at the rear of the present plant, and will be four stories high. They claim this will be the largest and most up-to-date factory of its kind in the world.

The Bethlehem Steel Company, South Bethlehem, Pa., which has recently started to manufacture large brass rolls for paper mills is prepared to furnish brass and bronze castings of any specified composition. They can handle orders for pump cylinder lining, seamless cast tubes, etc., of any size and weight up to 10,000 pounds either rough or finished. They solicit orders particularly for mixtures requiring more than ordinary care and attention in production.

The Sterling Casket Hardware Company has just completed the installation of their plant for the manufacture of casket hardware and now have a line of samples ready for market. Their line is for the jobbing trade exclusively. Geo. R. Bailey, who is president of the company, was representative of the Elgin Silver Plate Company, Elgin, Ill., for ten years, and is well acquainted with the trade all over the United States. The factory is located at 423-429 Kent avenue, Brooklyn, N. Y.

The firm of Richards & Co., Boston, Mass., who have been selling metals for nearly one hundred years, now look forward to an era of great business prosperity. Their own business has completely recovered from the depression of 1907 and 1908, and has been on a normal basis for the past six months. With the increase of trade, which the firm believes is bound to come, they also look for a firmer copper market and think this firmness is not far away.

The W. A. Eckert Manufacturing Company, of Buffalo, N. Y., was recently organized for the purpose of taking over the plant and patents of Mr. W. A. Eckert, who has been established in Buffalo in the manufacturing business for the past fifteen years. The Eckert Company will manufacture specialties in aluminum, brass and copper. The officers of the company are: W. A. Eckert, President and General Manager; F. G. Eckert, Vice-President, and E. L. Eckert, Secretary and Treasurer.

Another very substantial and commodious building is to be added to the Niagara Falls, Ont., branch works of the International Acheson Graphite Company. The structure is to be 50 feet wide by 105 feet long, and the contract has been awarded to W. S. Homan of Niagara Falls, Ont. The facilities afforded by this addition will make the Canadian works of the Graphite Company quite complete in its ability to care for a rapidly growing trade, made so by Canada's industrial growth. The building will contain a new grinding plant, in which the lubricating, electrotype, and other grades of powdered graphite, will be prepared for market. It will also contain a stock room for package goods, such as graphited greases, powders, etc., while a new shipping room will make it most convenient for promptly filling orders.

REMOVALS

Several Chicago firms announce new street numbers, among them the Bennett-O'Connell-Stevens Company, whose number is changed to 15-17 South Clinton street, and the Gardiner Metal Company, whose new number is 1356-1364 West Lake street.

The Sterling Machine and Stamping Company, of Vermillion, O., manufacturers of dies, metal stampings, electroplating SMSC generators, have completed the removal of their plant to Wellington, O., and are now running their factory with a full force. A new feature of the company's plant is a brass foundry equipped for handling jobbing work.

FIRES

The Sawyer Bronze Foundry, Oswego, N. Y., whose foundry was totally destroyed by fire last August, now have plans well under way for a new building. This building will be 50 by 100 feet, which is larger than the old plant. It will be entirely of steel.

FINANCIAL

The Standard Brass Manufacturing Company, Utica, N. Y., has increased its capital stock from $10,000 to $20,000.

The Chicago Steel and Brass Works, Chicago, Ill., has increased its capital stock from $20,000 to $30,000.

The Aluminum Goods Company, Chicago, Ill., has changed its name to the Western Aluminum Company. The capital is increased from $2,500 to $10,000.

The New York Metal Selling Company, New York, N. Y., of which M. E. Applebaum is president, has increased its capital from $100,000 to $250,000. New capital was required by the firm's increased business.

The International Nickel Company has declared the regular quarterly dividend of 1 per cent. and an extra dividend of one-half of 1 per cent. on its common stock, and the regular quarterly dividend of 1½ per cent. on its preferred stock.

REORGANIZATIONS

The John C. Barrett Company, Hartford, Conn. Capital $25,000 of which $5,000 is paid in. To make wood and metal patterns. Officers: John C. Barrett, president; John M. Taylor, vice-president; Harry B. Horne, treasurer. This business has been conducted for the past six years by Mr. Barrett, who employed from ten to fifteen patternmakers. Additional facilities will now be added to enable the new company to do a larger volume of business than ever. Their specialty is metal patterns.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

Midland Metal and Manufacturing Company, of Midland, Texas; capital stock, $3,600. Incorporators, F. F. Gary, M. T. Hooper and Mrs. J. Hooper.

Frank F. Smith Metal Window Hardware Company, Newark, N. J.; capital, $25,000. Incorporators, John L. Eisele, Frank F. Smith and Charles R. Smith.

American Ornamental Iron and Bronze Company, to manufacture articles of brass, bronze, etc., Minneapolis, Wis.; capital, $100,000. Incorporators, F. H. Wallis, Hubert Kelly, Alda Wallis.

Bois Sheet Metal Works, Yonkers, N. Y.; manufacture cornices, sky-lights and ornamental sheet metal work. Capital, $20,000. Incorporators: William D. Kelley, Fred Roffe, both of No. 45 East 42d street; N. Bois, No. 562 West 34th street, all of New York.

The General Brass and Tool Works, Nashville, Tenn., to operate a brass foundry and machine shop; capital $10,000. Incorporators, John H. Lawrence, George G. O'Bryan, William D. Trabue, Lawrence G. O'Bryan, and Charles C. Trabue, all of Nashville.

Articles of incorporation of the Mohawk Foundry Company of Schenectady, N. Y., were filed with the Secretary of State at Albany. The new company will engage in the manufacture of articles from iron, steel and other minerals of various kinds into salable form. The company will deal in iron and other metals. The concern is incorporated with a capital stock of $25,000, of which $3,000 has been paid in. The directors of the company are Adam F. Shaffer, of 1352 Union street, and A. F. Hallbaur and M. V. Hoffman, of 1207 Eastern avenue.

PRINTED MATTER

Sheet Aluminum Dipping Baskets are fully described in a circular issued by the Hanson & Van Winkle Co., Newark, N. J.

Crucible, Furnaces, Core Ovens and Squeezers are fully described in the new catalogue just issued by the J. D. Smith Foundry Supply Company, Cleveland, O.

The Yale Night Lock, a new night lock that makes a dead lock that cannot be forced when the door is closed, is told about in a small folder issued by the Yale & Towne Mfg. Co., 9 Murray street, N. Y.

Grinding Wheels, being the product of the Norton Company, Worcester, Mass., are told about in their catalogue which is attractively gotten up, and gives considerable valuable information relating to the Norton products.

Core Compound—An interesting 12-page pamphlet on Kantbebeat Dry Core Compound, written by Paul R. Ramp, is sent for the asking to founders and pattern-makers by the S. Obermayer Company, of Cincinnati, Ohio.

Buckeye Flux.—A pamphlet describing the brass flux made by the Buckeye Products Company, Cincinnati, O., is being sent to the trade. It gives information regarding this product and directions for its use in crucibles and in oil or gas furnaces.

Foundry Flasks are fully described in a large sheet circular sent out by the Sterling Wheelbarrow Company, of Milwaukee, Wis., who are manufacturers of the celebrated "Sterling" specially rolled steel foundry flasks. Cuts and prices of the various styles are also given.

R. Wallace & Sons Manufacturing Company. Wallingford, Conn., are on hand, as usual, with their attractive little magazine for September, called "The Wallace." It is filled up with bright thoughts and handsome illustrations of the very newest things in silver flat ware and table utensils.

Flexible Transmission.—A catalogue issued by the Coates Clipper Manufacturing Company, Worcester, Mass., gives a full description of the Coates Unit Link Flexible Shaft. This shaft is applied to all styles of drills and grinders and is also used for brass polishing, drilling and scratch brushing.

Platers' Materials Consisting of Red Copper Compound, White Metal Polish, Mohawk Cleaning Compound, Double Sul-

phate of nickel and ammonium, and in fact all materials or supplies required in the plating business, are described in a folder issued by E. Reed Burns, 40-42 Withers street, Brooklyn, N. Y.

SKALAX, is a briquette boiler cleaner manufactured by the Skalax Resolvent Company, Bradford, Pa. This compound not only prevents the boiler from scale but purifies the water before it enters into the boiler. The most important feature of the Skalax are told in a little pamphlet just issued by the company.

THE ATLAS MACHINE COMPANY, builders of brass working machinery of Waterbury, Conn., has issued their September catalogue. This is a phamphlet of 30 pages and gives illustrations and descriptions of single and double action power presses, edging, knurling and trimming lathes manufactured by them.

CHAPLETS. The Philadelphia Chaplet and Manufacturing Company, of Philadelphia, Pa., have issued a price list descriptive of their line of patented chaplets and anchors. This concern also handles contractors' trim work, metal specialties and railway, mill and mine supplies. Prices and discounts furnished upon application.

METALS, ALLOYS AND FLUXES, are described in a small folder issued by the United States Alloy Company, 1206 American Building, Baltimore, Md. This company manufactures all varieties of manganese, silicon and aluminum copper, together with special alloys of copper, tin, lead and aluminum and also special fluxes for brass foundry use.

THE SKIMMING TANK FOR BRASS FOUNDRY is described very fully in the latest pamphlet issued by the Metal Dross Economy Company, Bristol, Conn. They claim great results are obtained by the use of skimming tanks, whereby the dross from a pot of metal is skimmed directly into water. The company is having great success with this skimming tank throughout the country.

MOTOR GENERATOR. A series of photographs are issued by the Jantz & Leist Electric Company of Cincinnati, Ohio, showing the various types of generators manufactured by this concern, including those for electrotypers, platers and general deposition of metals; also direct connected engine type generators, slow-speed multipolar motors and slow-speed motors with removable perforated covers.

FACING MATERIALS.—A little twelve-page booklet has just been issued by the Joseph Dixon Crucible Company, Jersey City, N. J. Crucibles and all kinds of graphite products are described. Some general information on the proper use of facings, values of different articles and working conditions met in foundry practice are set forth at some length in the booklet, which is sent upon application.

THE LEVETT MANUFACTURING COMPANY, Matawan, N. J., are distributing a series of pamphlets illustrating and describing the extensive line of electroplater's supplies and polishing materials which they manufacture and import. The series include dynamos, motors, all kinds of buffing and polishing wheels, brushes, Vienna polish, rouges, compositions, etc. Other pamphlets will be issued from time to time.

PRICE LIST FOR PLUMBING BRASS GOODS. The official illustrated price list of the Brass Manufacturers of the United States and Canada has been issued and went into effect September 1. This catalogus gives cuts and price of all the standard materials used in the Plumbers' Supply Business. A copy of same can be obtained by addressing the secretary of the association, Wm. M. Webster, Chicago, Ill.

ANNEALING AND HARDENING FURNACES, for oil or gas fuel, are described in a four-page folder issued by the W. S. Rockwell Company, 50 Church street, New York. These furnaces and oil appliances have been in general use for more than 20 years. In addition to these furnaces the Rockwell Company designs and builds furnaces for all classes and for either oil, coal, gas or coke fuel. Catalogue will be sent for the asking.

BURN WATER REVELATION. This is the title of a booklet published by the National Economic Gas Company, of 20 Gold street, New York. The revelation gas blower is used without the use of air compressor or bellows, and is available where no power of any kind is obtainable. The best way to become acquainted with this remarkable device, is to send for the booklet, which the company is only too glad to distribute.

"CONSOLIDATED" POWER PRESSES. A comprehensive and exhaustive catalogue, and handsomely illustrated with half-tones, has been issued by the Consolidated Press and Tool Company of Hastings, Mich. The book contains 168 pages, is bound in green cloth, and gives descriptions of the "Consolidated" Power Press and other tools for finishing sheet metals manufactured by this concern. Parties interested should specify "Catalogue No. 5" when writing.

FORGING, HEATING, WELDING FURNACES.—A 40-page catalogue issued by the Rockwell Furnace Company, 26 Cortlandt street, New York, is well illustrated with cuts with the various furnaces manufactured by this company. Their production includes temperature forges and furnaces of all descriptions, either simple heating furnaces, brazing furnaces or rivet heating furnaces; a number of cuts showing the application of some of the company's products are included in the catalogue.

ALUMINUM. The Aluminum Company of America which hitherto have issued their book of useful information regarding aluminum and its applications in one volume, have now compiled this data in separate phamphlets. These phamphlets, five in number, are each 4½ by 6½ inches in size, attractively gotten up with different colored covers, and are listed under the following titles: Fabricated Aluminum, Methods of Working Aluminum, Useful Tables, Properties of Aluminum, and Alloys of Aluminum.

TINOL, is a descriptive phamphlet relating to this product, which is a soldering material made up of tin and lead in various proportions. This compound also acts as a flux, so that no acid, rosin or any flux are required. Tinol is made up in various forms, as, pastes with flux, rods with core flux, and wire with core flux. The tinol in each form is made up in various compositions of tin and lead, general directions for soldering with tinol are given in the phamphlet. Tinol is the producton of the American Tinol Company, 2100 Fairmont avenue, Philadelphia, Pa.

THE NATIONAL TUBE COMPANY OF PITTSBURG, Pa., have issued a handsome 46-page catalogue descriptive of the Shelby cold drawn seamless steel tubes. The book is fully illustrated with expensive cuts and half-tones, showing the process of the manufacture of a steel tube, beginning with the raw billet, and carrying it on down through the various processes until the finished tube is produced. There is included a most unique photograph of a design produced by the grouping together of over 3,000 separate pieces of steel tubing. This collection covers the top of a table and serves to illustrate in graphic manner the various shapes of tubes manufactured.

ADNEWS

Benjamin Middleditch, manufacturer of foundry equipment, Detroit, Mich., shows his tilting tumbling barrel for tumbling brass and bronze castings.

Haas Bros. Company, manufacturing chemists, Newark, N. J., call attention to their new metal cleaning compounds "Hasco Lime-off" and "Hascoleanser."

The Tube Bending Machine Company, Glen Ridge, N. J., give facts in their advertisement relative to the capacity and economy of their new tube polishing machines.

The Robinson Automatic Machine Company, Detroit, Mich., advertise their well-known automatic polishing machines, which are adapted for tube polishing, stove plate and many other kinds of work.

The Moyer Tramrail department of J. W. Paxson Company, 1030 North Delaware avenue, Philadelphia, Pa., tell in an attractive advertisement how the Moyer tramrail will return two dollars for every one spent in installing it.

Wm. H. Nichols, Cortlandt Building, Hudson Terminal, New York, has a card in this issue advertising foundry equipment. Mr. Nichols represents the makers of Berkshire molding machines and other well-known foundry apparatus.

The Eureka Pneumatic Spray Company, New York, take a page to illustrate their new sprayer for lacquering, bronzing, painting, enameling, japanning, etc. This company also makes air compressors, foot and hand-pumps, tanks, etc.

McKesson & Robbins, New York, are advertising lycopodium, for which they are "first hands," and also cyanide of potassium and other chemicals for platers and brass manufacturers. McKesson & Robbins is one of the largest chemical houses in the country.

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

	October 11, 1909. Pounds.
Stocks of marketable copper of all kinds on hand at all points in the United States, September 1, 1909..	135,632,565*
Production of marketable copper in the United States from all domestic and foreign sources during September, 1909	118,023,139
	253,655,704
Deliveries:	
For domestic consumption 52,105,155	
For export 50,077,777	
	102,182,932
Stock of marketable copper of all kinds on hand at all points in the United States, October 1, 1909.	151,472,772
Stocks increased during the month of September....	15,840,207

*From sources which had not hitherto come to the knowledge of the Association, it has within the present month been learned that in addition to what has been reported during the year there has been produced, January 1-August 31, 3,007,738 pounds; of which has been delivered to August 31, 2,572,103 pounds; leaving a balance on September 1 of 435,635 pounds, which has been included in the total stock of September 1.

METAL MARKET REVIEW

NEW YORK, October 8, 1909.

COPPER.—In the London market the price of standard copper is about the same as a month ago. Trading has been fairly active and prices fluctuated about £1 per ton during the month.

In the New York market there has been a good demand from consumers and the tone of the market is firmer and there seems less disposition to sell futures than a month ago.

Statistically the copper market is in bad shape; according to the Copper Producers' Association the stocks in America increased during the month of August 12,600,323 pounds and according to the foreign statistics the European stocks show an increase of about 3,500 tons or 7,875,000 pounds during the last two weeks of September.

These figures show that production is increasing more rapidly than consumption and the copper market in consequence is more or less unsettled. Producers show great faith in the market and are asking today higher than a month ago; secondshands seem to have sold out their supplies and the market today is in the hands of the producers.

Standard copper is quoted today at around 12.60 spot and 12.70 asked for December. Lake copper spot is quoted at 13.10 with November-December delivery at 13.25. Electrolytic spot 13 cents, November-December 13⅛ cents, with casting at around 13 cents.

TIN.—The London speculators have been rather active during the month and prices show a net advance of 30s. since our last review. London opened at £138 2s. 6d. and closed at £139 12s. 6d.

The consumption for the month of September was 3,200 tons, the total consumption in America for the nine months shows an increase of 5,950 tons over the same period last year. The market today for 5.10 ton lots spot is 30.50, with November-December delivery about 10 points higher.

LEAD.—The foreign lead market has advanced about 10s. per ton.

The New York market is about 5 points lower than a month ago and the market is easier. New York delivery carload lots 4⅜ cents per pound, St. Louis delivery 4.25.

SPELTER.—The foreign spelter market has advanced about 15s. per ton during the month.

In New York the market is rather firmer and prices are about ⅛ cent per pound higher. Carloads at $5.95.

In East St. Louis the market holds firm with prices about 15 points higher than a month ago. Carloads at $5.85.

ALUMINUM.—The market holds fairly firm, and the home producer is able to compete with the imported article and get all the business they care to take. Prices for round lots range from 22½ to 23 cents with small lots from 23½ to 24 cents.

SILVER.—The London silver market is about ⅛ cent per pound lower than a month ago, opening at 23 7/16d. and closing at 23¼d.

In New York prices at about ¼ cent lower at 51⅜.

QUICKSILVER.—Wholesale lots $43 to $43.50 per flask, jobbing lots $44 to $45.

PLATINUM.—The market is firmer and prices have advanced about $2 per ounce, ordinary $26.50 and hard $30.25 per ounce.

ANTIMONY.—The foreign market is about £1 lower.

In New York the market is dull and prices are about ⅛ cent lower. Cookson's 8½, Hallett's 8¼.

SHEET METALS.—Sheet copper is quoted at 17 cents base, with wire at 15 cents base. Sheet brass at 14 cents, with rods and wire at 14¼ cents. Sheet aluminum and rods have been reduced 1c. per pound.

OLD METALS.—There has been a better demand and rather more doing in scrap metals, but prices are no better and the market has been unsettled and unsatisfactory from a dealer's point of view. Prices are about the same as a month ago.

THE SEPTEMBER MOVEMENTS IN METALS

COPPER.	Highest.	Lowest.	Average.
Lake	13.35	13.00	13.10
Electrolytic	13.10	12.80	12.95
Casting	13.00	12.75	12.90
TIN	30.90	29.95	30.40
LEAD	4.45	4.35	4.40
SPELTER	5.90	5.70	5.80
ANTIMONY (Hallett's)	8.35	8.30	8.32
SILVER	.51¾	.57⅛	51.40

WATERBURY AVERAGE

The average price of lake copper per pound as determined monthly at Waterbury, Conn.

1909. Jan. 14⅜ Feb. 13¼ Mar. 12⅞ April 13 May 13¼ June 13½ July 13½ August 13½ Sept. 13¼.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Metal Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 61 Beekman street, New York.

INFORMATION BUREAU

Any firm intending to buy metals, machinery or supplies and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Commercial questions are answered by return mail. Our Information Bureau is for the purpose of answering questions of all kinds. Address THE METAL INDUSTRY, 61 Beekman street, New York.

Trade Wants on Advertising Pages 40 to 42 Following

Metal Prices, October 8, 1909.

NEW METALS.

	Price per lb. Cents.
COPPER—PIG, BAR AND INGOT AND OLD COPPER. Duty Free, Manufactured 2½c. per lb.	
Lake, car load lots	13.10
Electrolytic, car load lots	13.00
Casting, car load lots	13.00
TIN—Duty Free.	
Straits of Malacca, car load lots	30.50
LEAD—Duty Pigs, Bars and Old, 2½c. per lb.; pipe and sheets, 2¾c. per lb.	
Pig lead, car load lots	4.35
SPELTER—Duty 1⅜c. per lb. Sheets, 1⅝c. per lb.	
Western car load lots	5.85
ALUMINUM—Duty Crude, 7c. per lb. Plates, sheets, bars and rods, 11c. per lb.	
Small lots	28.00
100 lb. lots	25.00
Ton lots	24.00
ANTIMONY—Duty 1½c. per lb.	
Cookson's, cask lots, nominal	8.50
Hallett's, cask lots	8.25
Other cask lots	7.70
NICKEL—Duty Ingot, 6c. per lb. Sheet, strips and wire 35% ad valorem.	
Shot, Plaquettes, Ingots, Blocks, according to quantity	.45 to .60
MANGANESE METAL—Duty 20%	.80
MAGNESIUM METAL—Duty 3 cents per pound and 25% ad valorem	$1.50
BISMUTH—Duty free	1.80
CADMIUM—Duty free	.70
	Price per oz.
GOLD—Duty free	$20.67
SILVER—Duty free	.51⅜
PLATINUM—Duty free	26.50
QUICKSILVER—Duty 7c. per lb. Price per pound	.63c. to 65c.

OLD METALS.

Dealers' Buying prices. Cents per lb.		Dealers' Selling prices. Cents per lb.
11.50 to 12.00	Heavy Cut Copper	12.50 to 12.75
11.25 to 11.50	Copper Wire	12.25 to 12.50
10.00 to 10.50	Light Copper	11.00 to 11.25
10.75 to 11.25	Heavy Mach. Comp	12.00 to 12.50
8.00 to 8.50	Heavy Brass	9.00 to 9.25
6.00 to 6.50	Light Brass	7.00 to 7.25
7.50 to 8.00	No. 1 Yellow Brass Turnings	8.25 to 8.50
8.50 to 9.00	No. 1 Comp. Turnings	9.50 to 10.00
4.00 to 4.20	Heavy Lead	4.25 to 4.30
3.50 to 3.62½	Zinc Scrap	3.62½ to 3.87½
5.00 to 6.00	Scrap Aluminum, turnings	5.00 to 6.75
10.00 to 12.00	Scrap Aluminum, cast, alloyed	11.00 to 13.00
14.00 to 15.00	Scrap Aluminum, sheet (new)	16.00 to 18.00
18.00 to 19.00	No. 1 Pewter	—— to ——
20.00 to 25.00	Old Nickel	20.00 to 25.00

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% to 20%....according to quantity	28 to 35
Silicon Copper, 30%, guaranteed " "	38
Phosphor Copper, 5% " "	19 to 21
Phosphor Copper, 10% to 15%, guaranteed " "	28 to 30
Manganese Copper, 30% " "	30 to 35
Phosphor Tin " "	34 to 36
Brass Ingot, Yellow " "	9 to 10
Brass Ingot, Red " "	12 to 13
Bronze Ingot " "	11 to 12
Manganese Bronze " "	17 to 19
Phosphor Bronze " "	13 to 16
Casting Aluminum Alloys " "	29 to 35
PHOSPHORUS—Duty 18c. per lb. According to quantity	30 to 35

PRICES OF SHEET COPPER.

BASE PRICE, 17 Cents per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 50 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9½ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7¾ to 9½ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7¾ lb. sheet 30 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered as its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from. 3 cents per pound.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness 1 " " sq. ft.

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness 2 " " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ¾ inch diameter or over.....Base Price.

(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

ZINC—Duty, sheet, 1½c. per lb.	Cents per lb.
Carload lots, standard sizes, at mill	7.50 less 8%
Casks	8.00
Open casks	8.50

Metal Prices, October 8, 1909

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect September 15, 1909, and until further notice.

To customers who purchase less than 40,000 lbs. per year and over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.13½	$0.15	$0.17
Wire	.13½	.15¾	.17¼
Rod	.13½	.15¾	.18¼
Brazed tubing	.19⅝	—	.21½
Open seam tubing	.17⅝	—	.19½
Angles and channels, plain	.17⅝	—	.19½

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass...	½c. per lb. net advance
" —Best spring, drawing and spinning brass....	1½c. " " " "
Wire—Extra spring and brazing wire	½c. " " " "
" —Best spring and brazing wire	1c. " " " "

To customers who purchase less than 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.14½	$0.16	$0.18
Wire	.14½	.16¾	.18¼
Rod	.14½	.16¾	.19¼
Brazed tubing	.20⅝	—	.22½
Open seam tubing	.18⅝	—	.20½
Angles and channels, plain	.18⅝	—	.20½

5% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass...	½c. per lb. net advance.
" —Best spring, drawing and spinning brass....	1½c. " " " "
Wire—Extra spring and brazing wire	½c. " " " "
" —Best spring and brazing wire	1c. " " " "

BARE COPPER WIRE—CARLOAD LOTS.

14½c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	18½c. per lb. base.
100 lbs. to 300 lbs. in one order	19c. " " "
Less than 100 lbs. in one order	20½c. " " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ in O. D. Nos. 4 to 13 Stubs' Gauge, 18c. per lb.
Seamless Copper Tubing, 22c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	26	25	20	19	18	18	18	18	18	18	18	19	20	22	24	25

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1½ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 45 and 5%.

PRICES FOR MUNTZ METAL AND TOBIN BRONZE.

Muntz or Yellow Metal Sheathing (14" x 48")	14c. lb. net base
" " " Rectangular sheets other than Sheathing	16c. " " "
" " " Rod	15c. " " "
Tobin Bronze Rod	16c. " " "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bars in the rough 22½c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 4c. above price of pig tin in same quantity.

Not over 36 in. in width, not thinner than 22 B. S. Gauge, 5c. above price of pig tin.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

	Wider than..... and including..... in coils.	3in. 12in.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.
No.	13 and heavier	33	33	35	35	35	35	38	38	38
"	14	33	33	35	35	35	35	38	38	38
"	15	33	33	35	35	35	35	38	38	38
"	16	33	33	35	35	35	35	38	38	38
"	17	33	33	35	35	35	35	38	38	38
"	18	33	33	35	35	35	35	38	38	41
"	19	33	33	35	35	35	35	38	39	42
"	20	33	35	35	35	35	37	40	41	43
"	21	33	37	37	37	37	39	42	43	49
"	22	33	37	37	37	39	39	42	46	50
"	23	33	37	37	37	39	39	42	48	51
"	24	33	37	39	41	41	41	44	50	53
"	25	35	38	40	42	42	42	45	52	56
"	26	35	38	41	45	45	45	50	54	60
"	27	35	39	43	47	47	48	53	57	63
"	28	35	39	45	47	48	48	55	61	66
"	29	37	40	47	49	51	51	60	66	71
"	30	37	41	49	51	55	61	68	71	76
"	31	42	46	54	57	62	70	73	76	82
"	32	44	48	56	60	68	76	90	89	94
"	34	46	50	50	64	72	83	90	99	109
"	34	49	54	61	69	77	90	102	109	119
"	35	..	64	69	79	89	99	114	124	..
"	36	..	79	89	99	114	119	134	..	..
"	37	..	103	113	128	143	158	173	..	..
"	38	..	123	138	153	168	183	203	..	..
"	39	..	143	163	183	203	223	..	..	..
"	40	..	173	203	223	243	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 25 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1⅛ in.	1¼ in.	1⅜ in.	1½ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	26	23	..	..	13	11	9	8	15	22	
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..	
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..	
16.	.065.	..	..	..	..	..	27	26	26	23	22	20	20	20	20	20	26	30	58
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..	
20.	.035.	116	..	45	38	33	32	31	29	28	29	29	29	30	37	48	57	80	
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..	
22.	.028.	137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..	
24.	.022.	187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..	

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge.	000 to No. No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb....	31	31½	31½	32	32½	33	33½	34	35	36	37	42	45

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 6 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4	per cent.	to No.	19, B. & S. Gauge, inclusive	$0.60
6	"	"	19, " " "	.70
9	"	"	19, " " "	.85
12	"	"	19, " " "	1.00
15	"	"	19 " " "	1.15
16	"	"	19, " " "	1.20
18	"	"	19, " " "	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICE OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quality and market conditions. No fixed quotations can be given as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2c. to 3c. above the price of bullion.

PROFESSIONAL MEN AND EXPERTS

C. L. Constant Company

Laboratories: 61 Beekman Street Office: 42 Broadway, New York

C. L. CONSTANT, OFFICIAL CHEMIST TO THE NEW YORK METAL EXCHANGE

We analyze Ores, Metals, Drosses and furnace products.
Rates as reasonable as is consistent with good work.
We will quote special prices for yearly contracts.
Others may charge less but we guarantee correct results and prompt returns.
Entire charge taken of shipments to refineries.
Write us about your requirements. We advise on metallurgical processes.

LANGDON MOORE,
Counsellor at Law and Patent Attorney
PATENTS, TRADE-MARKS, DESIGNS and COPYRIGHTS
Washington Loan and Trust Bldg., Washington, D.C.
Formerly Examiner U. S. Patent Office

HUGH L. THOMPSON
CONSULTING ENGINEER
Waterbury, Conn., U. S. A.
COMPLETE ESTIMATES and Plans (including Power) for Brass and Copper Sheet, Rod, Wire and Tube Mills prepared, or your present departments redesigned and the latest improved American devices and machines installed.

P. O. Box 91 NEWARK, N. J.
FREDERICK B. FLINN
Analytical Chemist and Assayer
CONTRACT WORK A SPECIALTY
10 N. Maple Ave. East Orange, N. J.

THE HENRY SOUTHER ENGINEERING CO.
Engineers, Metallurgists and Analysts
440 Capitol Avenue HARTFORD, CONN.

GEORGE C. DAVIS
Analytical and Consulting Chemist
39 So. Tenth St. Philadelphia
ANALYSES OF ALLOYS, IRON, COAL, SAND, CLAY, CEMENT AND ORES
Established 1900

CONTROL
YOUR MIXTURES BY EMPLOYING
Experienced Chemists and Metallurgists
Accurate Analyses at Moderate Prices
THE DETROIT TESTING LABORATORY
1111 Union Trust Building DETROIT, MICH.

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Analytical Chemist and Metallurgical Engineer
Official Chemist of the New York Metal Exchange
61 Beekman Street NEW YORK

C. H. PROCTOR J. A. STREMEL
PROCTOR & STREMEL
CONSULTING PLATERS
Instructions and Formulas in all lines of Coloring, Plating and Dipping.
Artistic Effects on Jewelry, Etc., A Specialty
621 CHESTNUT STREET ARLINGTON, N. J.

LOUIS J. KROM
Consulting Metallurgist
Non-Ferrous Alloys a Specialty
61 Beekman Street NEW YORK

THIS SPACE
FOR SALE

SEE PAGE 40 FOR WANT ADVERTISEMENTS

TRADE WANTS

AN EXCHANGE FOR THE WANTS OF THE METAL TRADES.
Advertisements will be inserted under this head at 40 cents per line, 3 lines one dollar, for each insertion, excepting Situations Wanted, 20 cents per line, 3 lines half a dollar.
Answers sent in our care will be forwarded.

FOR SALE—METALS, MACHINERY AND SUPPLIES

FOR SALE
Two No. 125 STEELE-HARVEY FURNACES
used only a short time, good as new and in first-class condition. Will sell for a reasonable price.
Address STEELE-HARVEY, care of THE METAL INDUSTRY

FOR SALE
METAL CIRCULAR SAW
12" No. 1 CRESECENT SAW TABLE COMPLETE
GOOD AS NEW -:- CHEAP
PAUL S. REEVES & SON, Philadelphia, Pa.

FOR SALE
ONE NO. 2 DOUBLE-CHAMBER ROCKWELL FURNACE
THREE ROOT PRESSURE BLOWERS
All in First-Class Running Condition. Address FURNACE, Care THE METAL INDUSTRY

COPPER AND BRASS SCRAP LEAD AND COPPER
WASTE AND BELTING IRON AND MACHINERY
Bought and Sold. Write Particulars
WALSH'S SONS & CO., Newark, N. J.

FOR SALE.—Small pair of POWER ROLLS. Will sell cheap. WM. FABER, 728 Sansom Street, Philadelphia, Pa.

FOR SALE.—GOLD and SILVER PLATING and repair shop located in Maiden Lane, New York. For full particulars, address E. NOBIS, 1286 Prospect Avenue, Brooklyn, N. Y.

FOR SALE.—One second-hand HILL CRUSHER, recently made over; practically as good as ever. Address Z. Y. X., care THE METAL INDUSTRY.

PLATING DYNAMOS, also alternating and direct current motors and dynamos at bargain prices, all makes and sizes bought, sold and repaired. EUGENE L. RICHTER ELECTRIC CO., N. E. Cor. Uber and Columbia avenue, & F., Philadelphia, Pa.

J. P. FANNING, machinist, 678 Jefferson avenue, Brooklyn, N. Y.—Maker of Moulds for Casting Solder, Babbitt Metal, Bar Lead, etc. We also manufacture small work. Write for particulars.

FOR SALE—FOREIGN PATENTS

FOR SALE.—FOREIGN PATENTS on a TILTING CRUCIBLE FURNACE for melting Copper, Brass, Aluminum, etc. Address TILTING, care THE METAL INDUSTRY.

WANTED—METALS, MACHINERY AND SUPPLIES

WANTED
One or Two SECOND HAND No. 2 DOUBLE-CHAMBER ROCKWELL FURNACES, and BLOWERS
Must be in first class condition. Address, giving prices, etc.
DOUBLE CHAMBER, care METAL INDUSTRY

CASH PAID for bronze Powder Waste, Gas Mantle Dust, Bismuth, Nickel Mercury, Platinum, Osmoiridium and similar metals in any form. JOSEF RADNAI, 36 Fulton street, New York.

WANTED—Copies of THE METAL INDUSTRY for the months of MAY, 1906, NOVEMBER and DECEMBER, 1908. Anyone having the above mentioned copies, kindly advise THE METAL INDUSTRY.

OPPORTUNITIES

ANNOUNCEMENT
MODELING and ORNAMENTAL MOULD MAKING and ENGRAVING a Specialty to the trade.
THE ORNATE, - Rockford, Illinois

You Sell Your SCRAP NICKEL at a Loss of 25 CENTS PER POUND
We are in a position to show you how to save this loss
If interested write
BARCLAY & LIVINGSTON, 72 Beaver St., New York City

SALESMAN WANTED
Familiar with Brass and Iron Working machinery to handle one of the best selling and paying articles ever put on the market. Small investment required. Worth investigation.
CLEVELAND CHUCK CO.
514 Garfield Building Cleveland, Ohio

WANTED—To purchase a going brass foundry within Greater New York; capacity ten molders a day. State full particulars. Address B. F., care THE METAL INDUSTRY.

WANTED.—A BRASS, IRON, STOVE PLATE, ZINC FOUNDRY and Plating Works in San Francisco, Cal., wishes to manufacture good paying HARDWARE SPECIALTIES and NOVELTIES, such as electric heaters, plated brass goods, etc. Address Louis Gaenicke, 231 Madison street, San Francisco, Cal.

GOOD SALES, GOOD EQUIPMENT, GOOD ASSISTANTS and GOOD POSITIONS may be obtained by the insertion of a METAL INDUSTRY WANT.

EMPLOYMENT DEPARTMENT free to all. Competent stenographers, bookkeepers, typists, etc., furnished on short notice. Phone No. 794 Franklin. ROYAL TYPEWRITER COMPANY, 364 Broadway, New York City.

INQUIRIES

Inquiries received by THE METAL INDUSTRY for Metals, Machinery and Supplies. Further particulars may be obtained by addressing the inquiry number, care THE METAL INDUSTRY.

Inquiry No. 129.—We would like to correspond with manufacturers of telegraph hand key buttons that are used on the ordinary telegraph hand key senders.

Inquiry No. 130.—We wish to purchase in hundred pound lots hardened block-tin tubing 3/16 inch diameter with about 20 gauge. We may be able to use same in britannia metal. We can use short lengths. Actual length needed is about six inches.

Inquiry No. 131.—I would like to correspond with the manufacturers of belt strapping machines.

Inquiry No. 132.—I would like to correspond with manufacturers of platers tumbling barrels.

Inquiry No. 133.—We would like to correspond with manufacturers of wire gauze brushes, also iron glue pots, steam glue heaters, chemically enameled tanks and steel tanks. We would also like to hear from firms making rod and wire connections to connect up the tanks.

SITUATION OPEN—Chemists

WANTED—A competent CHEMIST for SMELTING WORKS making BRASS INGOTS. Prefer man with previous experience in this line. Wages $20 per week. Write stating experience and give references. H. B. SHERMAN MFG. COMPANY, BATTLE CREEK, MICH.

TRADE WANTS

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SITUATION OPEN—Smelters and Refiners

WANTED.—First-class SOLDER and BABBITT man experienced in mixing and pouring these metals. Address, SOLDER AND BABBITT, care THE METAL INDUSTRY.

WANTED.—WHITE METAL MIXER and REFINER; one thoroughly experienced in BABBITT and TYPE METAL. Must be capable of working up reverberatory furnace product and scrap metal. State experience, reference, etc. Address WHITE METAL, care THE METAL INDUSTRY.

SITUATIONS OPEN—Founders

WANTED

Expert help in a large BRASS MANUFACTURING PLANT. A man to take charge of brass furnaces producing 10,000 pounds of castings a day. Also a first-class MECHANIC for executive work around the factory. We can also use MONITOR HANDS and other MACHINE WORKERS. Factory located in New York City. Address, FACTORY, care THE METAL INDUSTRY.

WANTED—A first class CASTER who can make SOUND BRASS and COPPER TUBE CASTINGS from 5 inches down. Only experienced man need apply. Address, CONNECTICUT, care THE METAL INDUSTRY.

WANTED.—FOREMAN for jobbing ALUMINUM and BRASS FOUNDRY, thoroughly experienced along all lines. An energetic, ambitious man only wanted as there is opportunity for advancement and interest in the business. Address ADVANCEMENT, care THE METAL INDUSTRY.

WANTED—A first-class man to take charge of a well-equipped BRASS FOUNDRY, whose work is mostly in the automobile and machine line. BOX 87, SPRINGFIELD, MASS.

SITUATIONS OPEN—Finishers

WANTED—FOREMAN for CHANDELIER DEPARTMENT who has had considerable experience. State salary and last place employed. Address, CHANDELIER, care THE METAL INDUSTRY.

WANTED.—MONITOR hand capable of looking after monitor lathes. State age, experience and salary wanted. Address UNION METAL WORKS, CHELSEA, MASS.

SITUATION OPEN.—Finisher, metal worker to work on auto lamps and radiators. Address Max Bechtle, 327 9th street, Oakland, Cal.

SITUATION OPEN—Stampers

WANTED.—A man to take charge of a STEEL STAMPING PLANT and MACHINE SHOP. Must be familiar with PRESSES, DIES and STEEL DRAWINGS and must be capable of handling fifty men. Only those seeking permanent position and able to furnish satisfactory references need apply. Location near Boston. State fully, experience, references, age, where employed at present and salary expected. Address, BOSTON, care THE METAL INDUSTRY.

SITUATION OPEN—Enamelers

WANTED.—To correspond with a man who thoroughly understands the mixing of wet and dry enamels and the burning of same on cast iron reservoir boilers or a man who is capable of placing a plant of this kind in operation. Address ENAMELS, care THE METAL INDUSTRY.

SITUATIONS OPEN—Platers and Polishers

WANTED.—FOREMAN PLATER for plant engaged in the manufacture of SILVER PLATED HOLLOW WARE and NOVELTIES. Must be a man of executive ability and conversant with all details of the business. When you write give full particulars of your experience and state salary and where at present employed. Address, REX, care THE METAL INDUSTRY.

WANTED—FOREMAN for PLATING ROOM in CHANDELIER FACTORY. Must understand his business. State salary wanted. Address, PLATING ROOM, care THE METAL INDUSTRY.

SITUATIONS OPEN—Platers and Polishers—Continued

WANTED.—A man skilled in the foreign method of GILDING and SILVERING COPPER WIRE used in making TINSEL. Address, M. R. G., care THE METAL INDUSTRY.

SITUATIONS WANTED—Chemists and Metallurgists

Advertisements under Situations Wanted will be inserted for 20 cents per line, 3 lines for Half a Dollar.

SITUATION WANTED.—ANALYTICAL CHEMIST with six years' experience in foundry and metal work desires work on ores and all alloys for spare time. Address, ALLOYS, care THE METAL INDUSTRY.

SITUATION WANTED.—By a METALLOGRAPHIST, graduate Chemist experienced in Chemical, Physical, Metallographic laboratories and around automobile and steel works in France and the United States. Corrector of troubles. Specialist in research work. Highest education, highest references. Address, METALLOGRAPHIST, care THE METAL INDUSTRY.

SITUATION WANTED—As SUPERINTENDENT, MANAGER or other responsible position by a CHEMIST and METALLURGIST. Specialty STANDARD INGOT COPPER from any kind of COPPER BEARING MATERIAL, smelting and refining of white and yellow metal drosses and ashes, manufacture of Solder, Babbitt, Yellow and Red metals from scrap, including ALUMINUM and ALLOYS. Good buyer and correspondent (English and German). Best references. Salary moderate. Address, CONSCIENTIOUS, care THE METAL INDUSTRY.

SITUATIONS WANTED—Executive

SITUATION WANTED.—SUPERINTENDENT or SALESMAN. Familiar with the SILVER, BRONZE or BRASS NOVELTIES and HOLLOW WARE. Have been associated in the manufacturing business in this line. Desirous of corresponding with firms requiring the services of a capable man who is thoroughly familiar with the above work. Address, SILVERWARE, care THE METAL INDUSTRY.

SITUATION WANTED.—Position with an honest, reliable firm as Superintendent or Foreman. A BRASS or iron manufacturing plant preferred. Have had 18 years' experience. Address, P. O. BOX 473, WATERBURY, Conn.

SITUATIONS WANTED—Pattern Maker

SITUATION WANTED.—METAL PATTERN MAKING, as foreman or superintendent. Thoroughly acquainted with PLUMBERS' SUPPLIES and general hardware. Address, A. H. C., care THE METAL INDUSTRY.

SITUATIONS WANTED—Founders

SITUATION WANTED.—By an experienced man who can obtain the low cost of BENCH MOLDING in BRASS and IRON at one and two cents per mold. Twenty years experience in equipping foundries and molding machines. Address LOW COST, care THE METAL INDUSTRY.

SITUATION WANTED, FOUNDRIES.—As foreman of a brass and aluminum foundry. Have had 25 years' experience and can give the best of references. Address Trenton, care THE METAL INDUSTRY.

SITUATION WANTED.—BRASS FOUNDER with 16 years' experience in all kinds of foundry work. Thoroughly familiar with molding machines, oil furnaces and different mixtures. Have been foreman in several shops and can furnish good reference. Address BOX 203, care THE METAL INDUSTRY.

SITUATION WANTED—BRASS FOUNDRY FOREMAN or SUPERINTENDENT having had full charge of foundry for 20 years manufacturing car, locomotive, automobile and machinery castings. Can furnish the best of references. Address BOX 183, care THE METAL INDUSTRY.

SITUATION WANTED—By a CORE MAKER who has had 12 years' experience on all classes of cores, the last three years on CHANDELIER work. Capable of taking charge and can furnish good reference. Address BOX 197, care THE METAL INDUSTRY.

SITUATIONS WANTED—Finishers

SITUATION WANTED—By a first class CORE MOLDER who has had a large experience in this line. Can furnish reference. Address BOX 198, care THE METAL INDUSTRY.

SITUATION WANTED—By a BRASS MOLDER who has had 20 years' experience in this line. Can furnish reference. Address BOX 201, care THE METAL INDUSTRY.

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SITUATIONS WANTED—Platers and Polishers

SITUATION WANTED.—As FOREMAN PLATER. Thoroughly familiar with all solutions and is an expert on METALLIZING NON-METALLIC SUBJECTS. Would like to hear from reliable firms who desire the services of such a man. Address, METALLIZING, care THE METAL INDUSTRY.

SITUATION WANTED.—PLATER and OXIDIZER with 20 years' experience in BUILDERS' HARDWARE and ART METAL WORK desires a position as FOREMAN or ASSISTANT. Address, A. B. X., 88 Richmond Hill Avenue, Stamford, Conn.

SITUATION WANTED—By a plater with 10 years' experience on Silver, Nickel, Brass, Copper, Bronze, Oxidizing and Dipping. Address J. M., care of THE METAL INDUSTRY.

SITUATION WANTED.—By a FOREMAN PLATER who is an expert on NOVELTIES, BUCKLES, etc. Thoroughly familiar with all solutions on IRON, LEAD, BRITANNIA, BRASS, GERMAN SILVER, etc. Capable of taking charge of help. Address BUCKLES, care THE METAL INDUSTRY.

SITUATION WANTED.—By a FOREMAN PLATER who thoroughly understands the plating business from A to Z. Has had several years experience and is capable of taking charge. Address P. H., care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER with ten years' experience on Silver, Nickel, Brass, Copper, Bronze, Oxidizing and Dipping. Address DIPPING, care THE METAL INDUSTRY.

SITUATION WANTED.—PLATER and ETCHER who understands the name plate business with all its particulars. Willing to do all kinds of work in that line. Address ETCHER, care THE METAL INDUSTRY.

SITUATION WANTED.—As PLATER and COLORER by a young man who is thoroughly familiar with all finishes, especially on gilders' metal or any soft metal novelty work. Address, NOVELTY, care THE METAL INDUSTRY.

SITUATION WANTED.—By a practical plater. Expert on Gold Coloring of Novelties and Steel Gun Metal Finish. Address GOLD COLORING, care THE METAL INDUSTRY.

SITUATION WANTED—By a FOREMAN PLATER who has had a large epxeirence with the best concerns manufacturing sterling silver and chandeliers. Can run solutions of Brass, Nickel, Copper, Silver and Gold. Thoroughly understands depositing silver and copper on glass, and have a good white paint for this class of work. Up to date on all finishes, and can furnish good reference. Address L. S. H., care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER and BRONZER. Expert on bronze doors, sash and trim, galvano, wood, plaster and cement. Address BRONZER, care THE METAL INDUSTRY.

SITUATION WANTED.—FOREMAN PLATER on Gold, Silver, Nickel, Brass, Tin, Oxidizing, Green Finishes, etc., desirous of going West. Address GOLD PLATER, care THE METAL INDUSTRY.

SITUATION WANTED.—First class JEWELRY COLORER wishes a position. Thoroughly familiar with all kinds of plating and finishing. M. SCHWARTZ, 193 E. 7th street, New York.

SITUATION WANTED—PLATER, familiar with all colors, also plating on non-conducting surfaces such as glass, lace, wood, plaster, etc. Address H. KEPPLER, 39 Sutton street, Brooklyn, N. Y.

SITUATION WANTED by a practical FOREMAN PLATER understanding thoroughly all solutions and finishes. Address PRACTICAL, care THE METAL INDUSTRY.

SITUATION WANTED—By a PLATER who thoroughly understands the plating, polishing, oxidizing and enameling on iron and brass. Long experience as foreman of different departments in plating plants. Address BOX 177, care THE METAL INDUSTRY.

SITUATION WANTED—By a FOREMAN PLATER with 18 years' experience in plating business, 10 years' experience as foreman of plating and buffing departments. Address BOX 156, care THE METAL INDUSTRY.

SITUATIONS WANTED—Platers and Polishers—Continued

SITUATION WANTED—By a FOREMAN PLATER who can handle help to advantage. Can also do polishing and buffing. Nine years' experience, and can furnish best of reference. Address BOX 165, care THE METAL INDUSTRY.

SITUATION WANTED.—PLATER up to date in ALL FINISHES, six years' experience and can furnish the best of reference. Address BOX 131, care THE METAL INDUSTRY.

SITUATION WANTED.—By a FIRST CLASS PLATER AND POLISHER. Has had 16 years' experience and had charge of men for the last 10 years. Can handle any kind of a plant, understands all finishes and can give good reference. Address O-19, care THE METAL INDUSTRY.

SITUATION WANTED.—By a plater who has made a specialty of GALVANO PLASTIC WORK. Can furnish the best of reference. Address BOX 143, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class GOLD, SILVER, NICKEL, BRASS or COPPER and all round PLATER to take charge of large plating plant. Can give the best of references and will consider no position unless steady. Address O-13, care THE METAL INDUSTRY.

SITUATION WANTED—By a PLATER with 15 years' experience, thoroughly understanding all solutions, silver deposit, galvano plastic work, etc. Address BOX 169, care THE METAL INDUSTRY.

SITUATION WANTED—By a PLATER, POLISHER and BUFFER with 15 years' experience. Hustler and can produce good work. Sober, reliable and can furnish the best of reference from my last employer. Would like to locate west of Chicago. Address BOX 150, care THE METAL INDUSTRY.

SITUATION WANTED—By a first class PLATER thoroughly familiar with oxidizing and refinishing. Has had 18 years' experience and is capable of taking charge. Can furnish the best of references. Address BOX 192, care THE METAL INDUSTRY.

SITUATION WANTED—By PLATER, second man on brass, nickel, silver, copper. Understands all finishes. Out of town preferred. Address BOX 132, care THE METAL INDUSTRY.

SITUATION WANTED—By a PLATER of 16 years' experience, understanding all solutions, including verde antique. Address BOX 172, care THE METAL INDUSTRY.

SITUATION WANTED—By a PLATER with 12 years' experience, thoroughly understanding all details of the plating trade. Can furnish excellent reference. Address BOX 173, care THE METAL INDUSTRY.

SITUATION WANTED—A first class PLATER who is at the present time employed but desires to change, would like to hear from firms desiring a man who thoroughly understands the plating, buffing, etc., of all metals. Address BOX 174, care THE METAL INDUSTRY.

SITUATION WANTED—A FIRST CLASS PLATER who desires a position as foreman, who has had 22 years' experience in polishing, plating and buffing. Address BOX 188, care THE METAL INDUSTRY.

SITUATION WANTED—By a first class PLATER who understands every branch of solutions, dips, dynamos, polishing, grinding, cutting down, etc. Has had 20 years' experience with one firm who will give the best of references. Thoroughly familiar with any kind of work; up to date and hustler. Address BOX 186, care THE METAL INDUSTRY.

SITUATION WANTED—By a First Class PLATER with several years' experience. Can furnish the best of references. Address O-20, care THE METAL INDUSTRY.

SITUATION WANTED—FOREMAN of polishing, plating and buffing departments, who is thoroughly experienced on brass goods, fine mechanical tools and machinery. Twenty years' experience, 7 years of foremanship. Up to date, able to handle help to best advantage, to turn out work at low cost, sober, reliable and can furnish the best of reference from my last two employers. Address BOX 193, care THE METAL INDUSTRY.

SITUATION WANTED.—By an ELECTRO-PLATER, 18 years' experience with Nickel, Copper, Brass and Bronze solutions and oxidizing. Can furnish good reference. Address BOX M-9, care THE METAL INDUSTRY.